PATENT

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Margie A. Uribe

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Fernando Romero et al.

Serial No.: 10/804,287

Filed: March 18, 2004

For: **IONIC BLENDS AND METHODS OF PREPARATION AND APPLICATION THEREOF**

Group Art Unit: 1615

Examiner: Thurman K. Page

OK to SCAN
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THIRD PARTY SUBMISSION IN PUBLISHED APPLICATION (37 C.F.R. §1.99)

Sir:

The above-captioned application was published on September 22, 2005. This submission is being made within two months from the date of publication of the above application.

Attached hereto is a list and copy of the patents or publications submitted for consideration by the Office, including the date of publication of each patent or publication, with an English translation of all the necessary and pertinent parts of any non-English language patent or publication (including certificate of translation) in written form relied upon.

Service of this paper and the attachments hereto have been made on the applicant and the proof of such service is attached.

The Commissioner is hereby authorized to charge the processing fee set forth in §1.17(p), and any additional fees which may be required, or credit any overpayment to Deposit Account No. 07-1853.

Respectfully submitted,

Dated: November 22, 2005

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Listing of Patents & Publications

1. Japanese Publication No. S62-57605 published March 13, 1987 to Kaizuka
2. U.S. Publication No. 2004/0111810 published June 17, 2004 to Kaizuka
3. U.S. Publication No. US 2005/0061353 published March 24, 2005 to Kaizuka
4. U.S. Patent No. 6,936,557 issued August 30, 2005 to Park
5. U.S. Patent No. 4,857,306 issued August 15, 1989 to Roller
6. U.S. Publication No. 2003/0047027 published on March 13, 2003 to Sato
7. U.S. Patent No. 6,402,991 to Itakura et al. issued June 11, 2002
8. U.S. Patent No. 6,187,324 to Ogi et al. issued February 13, 2001
9. US. Publication No. 2004/0177453 to Vainshelboim issued June 14, 2005
10. U.S. Patent No. 5,770,089 to Kubo issued June 23, 1998

CERTIFICATE OF SERVICE

I hereby certify that on November 22, 2005, I served a copy of the foregoing THIRD PARTY SUBMISSION IN PUBLISHED APPLICATION (37 C.F.R. §1.99) upon the applicants' attorney of record by mailing a true and correct copy thereof by postage prepaid First Class United States Mail to the following address:

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Dated: November 22, 2005

Robert Fiore

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number of inventions: 1
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(the [Japanese] document totals 3 pages)

(54) Title of the Invention: Method for extracting effective component from a multi-element mineral

(21) Application Number: Sho 60-196932 (196,932/1985)
(22) Filing Date: 5 September 1985

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SPECIFICATION

1. Title of the Invention

Method for extracting effective component from a multi-element mineral

2. Claim

Claim 1.

A method for extracting an effective component from a multi-element mineral, characterized by

mixing water with a powder produced by grinding a multi-element mineral;

applying heat or pressure to the resulting liquid mixture and then allowing the liquid mixture to stand; and

separating the supernatant liquid.

3. Detailed Description of the Invention

Field of Industrial Applicability

The invention relates to the art of purifying or extracting an effective component from a multi-element mineral.

Description of the Prior Art and Problems Therewith

Multi-element minerals refer, for example, to minerals, such as perlite and pitchstone, in which silicon is the main component and a large number of elements are present in good balance. These multi-element minerals are known to have a number of activities. For example, they can elute mineral ions into water and adsorb or decompose the impurities in the water concomitant with feeding mineral into the water, and they can also exhibit a so-called inter-element affinity and can exhibit catalytic activity.

These activities of multi-element minerals have been noticed, and multi-element minerals have as a result been pulverized or ground to give a granular form, which has been used as a cleansing or purification stone. Multi-element minerals have also been ground to give a powder and this powder has been mixed into porcelain or ceramic followed by molding. However, all of these do nothing more than simply convert the multi-element mineral into a granular form or into a powder, and because of this the effects of the multi-element mineral are either not satisfactorily manifested or time is required until the effects appear.

Means Solving the Problems

This invention was pursued in order to solve the aforementioned problems with the prior art. An object of the invention is to provide a method for extracting an effective component from a multi-element mineral, wherein said method enables a satisfactory manifestation of the effects of the multi-element mineral and enables these effects to be produced more rapidly. The essential features of the invention comprise

mixing water with a powder produced by grinding a multi-element mineral;

applying heat or pressure to the resulting liquid mixture and then allowing the liquid mixture to stand; and

separating the supernatant liquid.

The separated supernatant liquid may be used as such as a liquid or may be used in the form of the powder afforded by a vacuum freeze dryer, a spray dryer, or the like.

Function

This invention enables a multi-functional effective component to be more effectively extracted from a multi-element mineral. The effects described hereinbelow appear when this effective component is added to, for example, a ceramic or cosmetic.

(1) When added to a ceramic water pitcher, water jug, tea set, or sake set, a mineral fraction elutes into water due to its ion-exchange function and in combination with this the impurities, colorants, odor, etc., are adsorbed and decomposed. The water or sake that is introduced will then have a good flavor free of sharpness. Water spoilage is also prevented.

(2) When added to a cosmetic, such as a hand cream, facial cleansing cream, or skin lotion, the functionalities of the skin and particularly its waste excretion function are enhanced

by eluted mineral and the effects of the cosmetic are promoted. A skin whitening activity and smoothness are obtained after application.

(3) When added to, for example, a shampoo or rinse, the eluted mineral provides a good foaming action and a very good dirt lift-off. In addition, foam rinse-off is also good and soft hair is obtained after shampooing. Dandruff and itching are also reduced.

(4) When added to moist paper towels, the ionization activity of the mineral prevents the growth of mold on the package, making the addition of alcohol unnecessary and also preventing allergy-induced inflammation when the product is used.

(5) When added to, for example, sanitary napkins, paper diapers, and geriatric incontinence products, a deodorization activity is seen due to the ionization activity of the mineral.

(6) When added to corrugated cardboard, a freshness preservation activity for fruits and vegetables held therein occurs due to the ionization activity of the mineral.

(7) When applied to a(n) [illegible] bathtub, the adhesion of contaminants within the bathtub is inhibited; good foaming is obtained during washing; and foam drainage is also good.

(8) When added to metal products, paints, and synthetic fibers, a variety of effects are seen due to the ionization activity of the mineral.

Example

An example of the invention is described below.

Perlite, a multi-element mineral, is first ground to a size of about 50 to 100 mesh in a ball mill to give a powder. This perlite is composed of the following components.

silicon anhydride	(SiO_2)	71.94%
aluminum oxide	(Al_2O_3)	14.94%
iron oxide	(Fe_2O_3)	2.54%
magnesium oxide	(MgO)	0.44%
calcium oxide	(CaO)	2.47%
alkali oxides	($K_2O + Na_2O$)	6.87%
manganese oxide	(MnO)	0.03%
phosphorus anhydride	(P_2O_5)	0.14%
ignition loss		3.43%
drying loss (at 110°C)		0.07%
other · titanium		trace

This powder is then introduced into water at the rate of about 100 to 200 g per 10 L water and is mixed with the water.

This liquid mixture is then heated for about 15 minutes at about 500°C [sic] or a pressure of about 5 kg/cm^2 is applied to this liquid mixture for about 15 minutes. The liquid mixture is then held for about 1 to 30 days at room temperature and, after most of the powder has sedimented, the supernatant liquid is separated off. The separated supernatant liquid may be used as such as a liquid or may be used in the form of the powder afforded by a vacuum freeze dryer or a spray dryer.

While an example of this invention has been described above, the specific embodiments of this invention are not limited to this example, and variants within a range that does not depart from the essential features of the invention are also included within the technical scope of the present invention.

For example, perlite is used in the example as the multi-element mineral, but pitchstone or bakuhanseki may also be used. Basically, other minerals may be used as long as their main component is silicon and they contain a large number of elements in good balance.

In addition, while the supernatant liquid is preferably a supernatant liquid from which most of the powder has thoroughly sedimented and that contains just powder fines, this supernatant liquid may also reside in a turbid state from which the powder has not thoroughly sedimented.

Moreover, the example provided above uses preferred values for the time and temperature for heating the liquid mixture and the pressure and pressure application time for application of pressure to the liquid mixture, but the invention is not limited to these values.

Effects of the Invention

This invention, because it has the features described hereinabove, accrues the excellent effect of enabling a more effective extraction from multi-element minerals of an effective component that has the various applications given below.

(1) When added to a ceramic water pitcher, water jug, tea set, or sake set, a mineral fraction elutes into water due to its ion-exchange function and in combination with this the

impurities, colorants, odor, etc., are adsorbed and decomposed. The water or sake that is introduced will then have a good flavor free of sharpness. Water spoilage is also prevented.

(2) When added to a cosmetic, such as a hand cream, facial cleansing cream, or skin lotion, the functionalities of the skin and particularly its waste excretion function are enhanced by eluted mineral and the effects of the cosmetic are promoted. A skin whitening activity and smoothness are obtained after application.

(3) When added to, for example, a shampoo or rinse, the eluted mineral provides a good foaming action and a very good dirt lift-off. In addition, foam rinse-off is also good and soft hair is obtained after shampooing. Dandruff and itching are also reduced.

(4) When added to moist paper towels, the ionization activity of the mineral prevents the growth of mold on the package, making the addition of alcohol unnecessary and also preventing allergy-induced inflammation when the product is used.

(5) When added to, for example, sanitary napkins, paper diapers, and geriatric incontinence products, a deodorization activity is seen due to the ionization activity of the mineral.

(6) When added to corrugated cardboard, a freshness preservation activity for fruits and vegetables held therein occurs due to the ionization activity of the mineral.

(7) When applied to a(n) [illegible] bathtub, the adhesion of contaminants within the bathtub is inhibited; good foaming is obtained during washing; and foam drainage is also good.

(8) When added to metal products, paints, and synthetic fibers, a variety of effects are seen due to the ionization activity of the mineral.

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CERTIFICATION

The following patent application was translated from Japanese into English by OSTRANS, LLC

11) *Laid Open Number:Sho 62-57605 (57,605/1987)*
(43) *Laid Open Date:13 March 1987*

(54) *Title of the Invention:* *Method for extracting effective component from a multi-element mineral*

(21) *Application Number:* *Sho 60-196932 (196,932/1985)*

This represents an accurate and complete English translation of the original Japanese-language document to the best of our ability and belief.

Robert G. Sellin
November 18, 2005

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JP62057605

Publication Title:

METHOD FOR EXTRACTING EFFECTIVE COMPONENT FROM MULTIPLE-ELEMENT MINERAL

Abstract:

Abstract of JP62057605

PURPOSE:To extract effective components from a multiple-element mineral while sufficiently and rapidly exhibiting the effect of the multiple-element mineral b heating or pressurizing a liq. mixture of the powdery multiple-element mineral and water, allowing the mixture to stand and then separating the supernatant liq. CONSTITUTION:A multiple-element mineral such as perlite and pitch-stone consisting essentially of silicon and wherein the contents of many elements are well-balanced is crushed into powder. A liq. mixture of the powder and water is heated or pressurized and then allowed to stand. Then the supernatant liq. is separated. The separated liq. is used as such or dried by a vacuum freeze drier, a spray drier, etc., to form powder which is used. Data supplied from the esp@cenet database - Worldwide

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⑲日本国特許庁(JP)　⑪特許出願公開

⑫公開特許公報(A)　昭62-57605

⑤Int.Cl.⁴	識別記号	庁内整理番号	⑬公開　昭和62年(1987)3月13日
B 01 D 11/02		A-2126-4D	
C 02 F 1/68		6816-4D	
// C 22 B 3/00		7325-4K	審査請求　未請求　発明の数 1　(全3頁)

⑭発明の名称　多元素鉱物からの有効成分抽出方法

⑳特　願　昭60-196932

㉒出　願　昭60(1985)9月5日

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明　細　書

1.発明の名称

多元素鉱物からの有効成分抽出方法

2.特許請求の範囲

1)　多元素鉱物を破砕して形成した粉状体を水と混合したのち、この混合液を加熱又は加圧し、次にこれを放置したのち上澄液を分離することを特徴とする多元素鉱物からの有効成分抽出方法。

3.発明の詳細な説明

(産業上の利用分野)

本発明は、多元素鉱物からその有効成分を精製又は抽出する技術に関する。

(従来技術とその問題点)

多元素鉱物とは、例えば、真珠岩や松脂岩のように珪素を主成分とし、多数の元素がバランスよく含まれている鉱物を言い、この多元素鉱物は水中でミネラルイオンを溶出し、水にミネラルを供給すると共に水中の不純物を吸着あるいは分解する作用や、いわゆる元素間親和力や触媒作用等があることが知られている。

そして、多元素鉱物の上述のような作用に着目して、従来、多元素鉱物を破砕して粒状に形成してこれを浄化石として利用したものや、多元素鉱物を粉砕して粉末にし、これを磁器や陶器等の中に混合させて成形したもの等があるが、これらはいずれも多元素鉱物をただ単に粒状や粉末にしたものにすぎないので、その効果が十分に発揮されないし、又、その効果の発生までに時間がかかる等の問題があった。

(問題点を解決するための手段)

本発明は、このような従来の問題点を解決するためになされたもので、その目的とするところは

、多元素鉱物の効果を十分に発揮することができ、しかも、より迅速にその効果を生じさせることができる多元素鉱物からの有効成分抽出方法を提供することにあり、その要旨とするところは、多元素鉱物を破砕して形成した粉状体を水と混合したのち、この混合液を加熱又は加圧し、次にこれを放置したのち上澄液を分離することにある。分離した上澄液は液体としてそのまま使用してもよいし、この上澄液を真空凍結乾燥機やスプレードライヤー（噴霧乾燥）等により粉末にして使用してもよい。

（作用）

本発明によれば、多元素鉱物から各種の効用がある有効成分をより効果的に抽出することができ、これを陶磁器や化粧品等に添加すれば以下に述べるような効果がある。

(1) 陶磁器製の水注し、水差し、茶器セット、酒器セットに添加すると、そのイオン交換作用により水中にミネラル分を溶出すると共に不純物、色素、臭気等を吸着および分解して、中に入れた水や酒が美味でまろやかになり、かつ水の腐敗が防止される。

(2) ハンドクリーム、洗顔クリーム、スキンローション等の化粧品に添加すると、溶出したミネラルにより皮膚の機能、特にその老廃物排泄機能を高め、化粧品としての効果を促進する。又、使用後は肌の漂白作用やなめらかさが得られる。

(3) シャンプー、リンス等に添加すると、溶出したミネラルにより泡立ちがよく、汚れ落ちが非常によい。又、泡切れもよく洗髪後はシットリした感になり、フケやカユミが減少する。

(4) 紙おしぼりに添加すると、ミネラルのイオン化作用により容器のカビの発生がなく、したがって、アルコールの添加が必要なく、使用時においてアレルギーによる炎症も生じない。

(5) 生理ナプキン、紙おむつ、老人用紙シーツ等に添加すると、ミネラルのイオン化作用により消臭効果が認められる。

(6) 段ボールに添加すると、ミネラルのイオン化作用により中に収容した野菜や果実の鮮度保持効果がある。

(7) 硅藻浴槽に適用すると、浴槽内に汚れがつきにくく、洗いの際の泡立ちがよく泡切れもよい。

(8) 金属製品、塗料、合成繊維に添加してもミネラルのイオン化作用により各種の効果が認められる。

（実施例）

以下、本発明の実施例を詳述する。

まず、多元素鉱物の一つである真珠岩をボールミルで約５０～１００メッシュの大きさに粉砕して粉状体を形成する。尚、真珠岩は下記の成分からなるものである。

無水珪素	(SiO_2)	71.94 %
酸化アルミニウム	(Al_2O_3)	14.94 %
酸化鉄	(Fe_2O_3)	2.54 %
酸化マグネシウム	(MgO)	0.44 %
酸化カルシウム	(CaO)	2.47 %
酸化アルカリ	($K_2O + Na_2O$)	6.87 %
酸化マンガン	(MnO)	0.03 %
無水燐酸	(P_2O_5)	0.14 %
熱灼減量		3.43 %
乾燥減量 （１１０度における）		0.07 %
その他チタン		痕　跡

次に、上記粉状体を水10ℓに対して約100～200gの割合で投入して、これを水と混合する。

次に、この混合液を約500℃で約15分加熱するか、又は、この混合液に約5kg/cm²の圧力を約15分間かけたのち、これを室温で約1～30日間放置して粉状体の大部分を沈澱させた後、その上澄液を分離する。分離した上澄液は、液体としてそのまま使用してもよいし、真空凍結乾燥機やスプレードライヤー（噴霧乾燥）により粉末にして使用してもよい。

以上、本発明の実施例について説明したが、本発明の具体的な構成は前記した実施例に限定されるものではなく、発明の要旨を逸脱しない範囲の変更があっても本発明の技術的範囲に含まれる。

例えば、実施例では、多元素鉱物として真珠岩を使用したが、松脂岩や安飯石でもよく、要は、珪素を主成分とし、多数の元素がバランスよく含まれている鉱物であれば、他のものであってもよい。

又、上澄液としては、粉状体の大部分が十分に沈澱し粉状体の微粉末が混合しているだけの上澄液が好ましいが、粉状体が十分に沈澱せずに混濁状態になっているものであってもよい。

又、混合液の加熱温度、加熱時間、あるいは圧力の大きさ、圧力をかける時間は上記実施例が好ましいが、これに限定されるものではない。

（効果）

本発明は、上述のように構成したので、以下に述べるような各種の効用を奏する有効成分を多元素鉱物からより効果的に抽出することができるという卓抜した効果がある。

(1) 陶磁器製の水注し、水差し、茶器セット、酒器セットに添加すると、そのイオン交換作用により水中にミネラル分を溶出すると共に不純物、色素、臭気等を吸着および分解して、中に入れた水や酒が美味でまろやかになり、かつ水の腐敗が防止される。

(2) ハンドクリーム、洗顔クリーム、スキンローション等の化粧品に添加すると、溶出したミネラルにより皮膚の機能、特にその老廃物排泄機能を高め、化粧品としての効果を促進する。又、使用後は肌の漂白作用やなめらかさが得られる。

(3) シャンプー、リンス等に添加すると、溶出したミネラルにより泡立ちがよく、汚れ落ちが非常によい。又、泡切れもよく洗髪後はシットリした髪になり、フケやカユミが減少する。

(4) 紙おしぼりに添加すると、ミネラルのイオン化作用により容器のカビの発生がなく、したがって、アルコールの添加が必要なく、使用時においてアレルギーによる炎症も生じない。

(5) 生理ナプキン、紙おむつ、老人用紙シーツ等に添加すると、ミネラルのイオン化作用により消臭効果が認められる。

(6) 段ボールに添加すると、ミネラルのイオン化作用により中に収容した野菜や果実の鮮度保持効果がある。

(7) 浴槽浴槽に適用すると、浴槽内に汚れがつきにくく、洗いの際の泡立ちがよく泡切れもよい。

(8) 金属製品、塗料、合成繊維に添加してもミネラルのイオン化作用により各種の効果が認められる。

特許出願人　貝塚　和敏

US 20040111810A1

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Kaizuka (43) Pub. Date: Jun. 17, 2004

(54) HAIR DYE

(76) Inventor: Kazutoshi Kaizuka, (US)

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(52) U.S. Cl. 8/405

(57) ABSTRACT

A hair dye contains the powder of a poly-element mineral to improve the coloring and colorfastness of the hair dye.

HAIR DYE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a hair dye which contains a poly-element mineral to increase the effectiveness and colorfastness of hair dyes applied on hair.

[0003] 2. General Background and State of the Art

[0004] Conventional oxidating hair dyes contain oxidative dyes such as para-phenylene amine or para-amino phenol and acidic dyes that further include contact dyes such as tar-based colorants, as described for example in Japanese application publication no. JP-2000-128750-A. Many other compositions of hair dyes are known. However, there is a need for improvements to hair dyes that can increase the colorfastness of the dye, prevent fading after multiple washes, and improve the feel of the hair after the dye is applied.

INVENTION SUMMARY

[0005] The present invention is directed to a hair dye containing poly-element minerals. The poly-element mineral improves the effectiveness of the hair dye by increasing the coloring capacity of the dye, preventing fading after the hair is washed and dried multiple times, decreasing irritation of the scalp after the dye has been applied and improving the stability of the dye in the hair. The poly-element mineral also enhances the feel of the hair when the dyed hair is brushed.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0006] The hair dye of the present invention comprises a known hair dye composition, as for example the hair dye described in the published application entitled "Hair Dye Composition" described in JP-2000-128750-A, combined with a poly-element mineral powder formed by crushing a poly-element mineral. The hair dye may contain between 0.01% to 20% of the poly-element mineral by weight but preferably between 0.01% to 10%. The poly-element minerals present in the hair dye include silicon-based poly-element minerals which may be found for example as perlite, pitchstone, and tourmaline. In addition to releasing anions, these minerals radiate electromagnetic waves (feeble energy) with a wavelength of 4 to 14 μm. These electromagnetic waves generated by the poly-element minerals excite the electrons in the atomic nuclei surrounding the strands of hair in which the hair dye of the present invention is applied. As a result, water clusters are cut or shortened, decreasing the volume of water and increasing the specific gravity. Furthermore, the free water will attach more readily to the external cell membranes allowing the penetration of water and Ca^{2+} within the cells to activate several functions of the cells.

[0007] Applying the hair dye containing poly-element minerals to a person's hair increases his or her blood circulation in the scalp and promotes hair growth. In addition, the poly-element minerals release anions which act on the cuticle and the outer layer of a hair strand, to maintain the hair's luster. Hair with damaged follicles significantly benefits from the presence of poly-element minerals in the hair dye. The hair dye causes superior coloring in the hair because the poly-element minerals increase the penetration of the hair dye into the hair strands and limits the departure of the intercellular binding material known as the cell membrane complex from the cortex region of the hair strands. When heat is applied to the dyed hair, the heat combines with the electromagnetic waves emitted by the poly-element minerals to produce far-infrared radiation, which promotes better coloring of the hair and colorfastness of the dye. When the poly-element mineral is mixed with an oxidative dye, the resulting buffering effect mitigates alkali irritation to the hair and scalp. Adding the poly-element mineral to acidic hair dyes and color treatments accelerates the coloring of the hair by increasing the permeation capacity of the dye molecules into the hair strands.

[0008] To produce the powdered mixture, a poly-element mineral, such as perlite, pitchstone or tourmaline, may be milled into a powder the size of about 0.5 to 3 μm, preferably 0.5 to 1 μm, for example by using a ball mill. Even though the hair dye may contain only one poly-element mineral, the hair dye preferably contains two or more powdered poly-element minerals. The powder can be used after it has been milled or, alternatively, the milled powder can be further purified by mixing it with water, then heating or pressurizing the solution. Known techniques of vacuum-freeze drying or spray drying the solution can then be used to isolate the powder which is then mixed with the hair dye.

[0009] The following chart shows the contents of perlite:

silicon dioxide (SiO_2)	71.94%
aluminum oxide (Al_2O_3)	14.94%
ferrous oxide (Fe_2O_3)	2.54%
Magnesium oxide (MgO)	0.44%
calcium oxide (CaO)	2.47%
alkali oxide (K_2O + Na_2O)	6.87%
manganese oxide (MnO)	0.03%
phosphoric anhydride (P_2O_5)	0.14%
ignition loss	3.43%
drying loss (at 110° C.)	0.07%
other, titanium	trace

[0010] The contents of pitchstone, another poly-element mineral, are shown in the following table:

SiO_2	75.50%
Al_2O_2	14.00%
Fe_2O_2	0.70%
TiO_2	0.03%
CaO	0.34%
MgO	0.03%
K_2O	4.50%
Na_2O	4.30%
Ignition loss	0.60%

[0011] Although the poly-element mineral can be added to the many known types of hair dyes, the poly-element minerals should preferably be added to oxidative, acidic or color treatment (nitro) dyes for optimal results.

[0012] The oxidative dyes used in the present invention contain at least one and preferably two or more of the following compounds or any salt thereof in the range of 0.01% to 5% of the weight of the hair dye: 5-amino ortho

cresol, ortho amino phenol, ortho chloro para-phenylene diamine, 2-4 diamino phenol, 2,6-diamino pyridine, 4,4'-diamino diphenyl amine, 1,5-dihydroxy naphthalene, diphenyl amine, toluene-2,5-diamine, toluene-3-4-diamine, para-amino phenol, para-phenylene diamine, para-methyl amino phenol, N-phenyl para-phenylene diamine, meta amino phenyl, meta phenylene diamine, resorcin and 2,4-diamino phenoxy ethanol.

[0013] The coloring dyes, which are also known as nitro dyes, used in the present invention contain any combination of the following compounds or any salt thereof in the range of 0.01% to 5% of the weight of the hair dye to produce the desired shade or color: 2-nitro para-phenylene diamine, 4-nitro ortho phenylene diamine, 1-amino-2-methyl-6-nitro benzene, 1-amino-2-nitro-4-methyl amino benzene, 4-(2'-hydroxy ethyl)amino-3-nitro-methyl benzene, 1-bis(β-hydroxy ethyl) amino-3-nitro-4-amino benzene, 1-amino-2-(β-hydroxy ethyl)amino-5-nitro benzene, 1-hydroxy-3-nitro-4-(3-hydroxy propyl amino) benzene, N,N'-dimethyl-N-hydroxy ethyl-3-nitro para-phenylene diamine, N-methyl-2-nitro para-phenylene diamine, 3-methyl amino-4-nitro phenoxy ethanol, 2-nitro-5-glyceryl-methyl amine, 1-amino-3-methyl-4-(β-hydroxy ethyl)amino-6-nitro benzene and any basic dyes such as Basic Red 76 (C.I. 12245), Basic Brown 16 (C.I. 12250), Basic Brown 17 (C.I. 12251), Basic Yellow (C.I. 12719), Basic Violet 10 (C.I. 45170) and Basic Blue 99 (C.I. 56059).

[0014] The acidic dyes used in the present invention contain at least one and preferably two or more of the following compounds in the range of 0.01% to 5% of the weight of the hair dye: 1-(4-sulfo- 1-naphthylazo)-2-naphthol-3,6-disulfonic acid trisodium salt, 9-ortho carboxy phenyl-6-hydroxy-2,4,5,7-tetraiodo-3-iso xantone disodium salt, 1-(4-sulfo-1-naphthylazo)-2- naphthol-6,8-disulfonic acid trisodium salt, 9-(4'-sulfo-2'-sulfonium phenyl)-6-diethyl amino-3-(N,N-dithyl imino)-3-iso xanthyl monosodium salt, 3-carboxyl-5-hydroxy- 1-para-sulfonyl-4-para-sulfonyl azo pyrazol trisodium salt, 3-carboxy-5-hydroxy-1-para-sulfonyl-4-para-sulfonyl azo pyrazol disodium salt, 1-para-sulfonyl azo-2-naphthol-6-sulfonic acid disodium salt, 4-{[4-(N-ethyl-meta sulfo benzyl amino)-phenyl]-(2-sulfonium phenyl)-methylene}-[1-(N-ethyl-N-meta sulfo benzyl)-$\Delta^{2,5}$-cyclohexadiene imine] disodium salt, 1-para-sulfo phenyl azo-2-naphthol monosodium salt, 9-ortho carboxy phenyl-hydroxy-3-iso xanthone disodium salt, 1-hydroxy-3,6,8-pyrene trisulfonic acid trisodium salt, 4-{[4-(N-ethyl-benzyl amino)-phenyl]-(5-hydroxy-4-sulfo-2-sulfophenyl)-methylene}-(N-ethyl-Nbenzyl-$\Delta^{2,5}$-cyclohexadiene imine) monosodium salt, 2,4-dinitro-1-naphthol-7-sulfonic acid disodium salt, 1-hydroxy-4-(ortho sulfo para-tolueno)-anthraquinone monosodium salt and 8-amino-7-para-nitro phenyl azo-2-phenyl azo-1-naphthol-3,6-sulfonic acid disodium salt.

EXAMPLES

[0015] The following examples further illustrate the present invention and preferred embodiments. All parts and percentages are by weight unless otherwise indicated.

[0016] In Examples 1-3, a hair dye was prepared by mixing each of the components enumerated and pure water to create an aqueous solution. The inventive product samples 1, 2 and 3 in each Example contained different concentrations of the poly-element mineral, but the weight percentage of the other components remained identical.

[0017] To conduct the experiments, approximately two grams of the sample hair dye was applied to a small bunch of yak hair having the same approximate weight. The hair dye was left in the yak hair for fifteen minutes in a temperature condition of forty degrees centigrade. Then, the yak hair was shampooed, rinsed and dried to evaluate the coloring capacity of the hair dye. Afterwards, the sequence of shampooing, rinsing and drying was repeated five times to evaluate how quickly the dye faded. Information for each of the inventive product samples and a comparative product sample without a poly-element mineral was recorded.

Example 1

[0018]

	Concentration (%)			
	Inventive Product 1	Inventive Product 2	Inventive Product 3	Comparative Example 1
Perlite	0.10	3.00	6.00	0.00
Toluene-2,5-diamine sulfate	1.10	1.10	1.10	1.10
Resorcin	0.18	0.18	0.18	0.18
5-amino ortho cresol	0.08	0.08	0.08	0.08
Para-amino phenol	0.45	0.45	0.45	0.45
25% ammonia water	8.00	8.00	8.00	8.00
Cetostearyl alcohol	2.00	2.00	2.00	2.00
Polyoxy ethylene cetyl ethyl	0.50	0.50	0.50	0.50
Lauryl sulfate	1.00	1.00	1.00	1.00
Pure water	Remainder	Remainder	Remainder	Remainder
Coloration	Good	Good	Good	Normal
Fading	Good	Good	Good	Poor

Example 2

[0019]

	Concentration (%)			
	Inventive Product 1	Inventive Product 2	Inventive Product 3	Comparative Example 1
Perlite	0.10	3.00	6.00	0.00
8-amino-7-para-nitro phenyl azo-2-phenyl azo-1-naphthol-3,6-disulfonic acid disodium salt	0.02	0.02	0.02	0.02
1-hydroxy-4-(ortho sulfo para-toluene)-anthraquinone monosodium salt	0.02	0.02	0.02	0.02
1-para-sulfonyl azo-2-naphthol monosodium salt	0.20	0.20	0.20	0.20
Ethanol	25.0	25.0	25.0	25.0
Benzyl alcohol	10.0	10.0	10.0	10.0
Lactic acid	3.00	3.00	3.00	3.00
Hydroxy ethyl cellulose	0.50	0.50	0.50	0.50

-continued

	Concentration (%)			
	Inventive Product 1	Inventive Product 2	Inventive Product 3	Comparative Example 1
Pure water	Remainder	Remainder	Remainder	Remainder
Coloration	Good	Good	Good	Normal
Fading	Good	Good	Good	Poor

Example 3

[0020]

	Concentration (%)			
	Inventive Product 1	Inventive Product 2	Inventive Product 3	Comparative Example 1
Perlite	0.10	3.00	5.00	0.00
Nitro para-phenylene diamine	0.2	0.2	0.2	0.2
Para-nitro meta phenylene diamine sulfate	0.2	0.2	0.2	0.2
Cetostearyl alcohol	2.00	2.00	2.00	2.00
Polyoxy ethylene cetyl ethyl	0.50	0.50	0.50	0.50
Cetyl trimethyl ammonium chloride	1.00	1.00	1.00	1.00
Pure water	Remainder	Remainder	Remainder	Remainder
Coloration	Good	Good	Good	Normal
Fading	Good	Good	Good	Poor

[0021] In Examples 4-9, the hair dye, according to the enumerated composition of each Example, was mixed in equal parts with a 6% solution of hydrogen peroxide before it was applied to the hair. The 6% hydrogen peroxide solution included the following components: hydrogen peroxide (6.0% by weight), salicylic acid (0.05% by weight), a pH adjuster to bring the pH to 2.8, and pure water (remainder). After the hair dye and the hydrogen peroxide solution was applied, the results were recorded. For each of the Examples 4-9, no irritation of the scalp was observed, the resulting hair color was similar to the expected hair color, and the dyed hair could be combed easily. In addition, the hair coloring was stable over time.

Example 4

Brown Hair Dye

[0022]

Perlite	0.10
Toluene-2,5-diamine sulfate	0.10
Resorcin	0.18
5-amino ortho cresol	0.08
Para-amino phenol	0.45
Meta amino phenol	0.05
25% ammonia water	8.00
Lauryl sulfate	1.00
Cetostearyl alcohol	4.00
Pure water	Remainder

Example 5

Afro-Violet Hair Dye

[0023]

Perlite	0.10
5-amino ortho cresol	0.40
Para-amino phenol	0.40
25% ammonia water	8.00
Lauryl sulfate	1.00
Cetostearyl alcohol	4.00
Pure water	Remainder

Example 6

Auburn Hair Dye

[0024]

Perlite	6.00
Toluene-2,5-diamine sulfate	0.02
5-amino ortho cresol	0.40
Para-amino phenol	0.40
25% ammonia water	8.00
Lauryl sulfate	1.00
Cetostearyl alcohol	4.00
Pure water	Remainder

Example 7

Yellow Hair Dye

[0025]

Perlite	0.50
Para-nitro meta phenylene diamine sulfate	0.20
Para-nitro ortho phenylene diamine sulfate	0.20
25% ammonia water	8.00
Lauryl sulfate	1.00
Cetostearyl alcohol	4.00
Pure water	Remainder

Example 8

Golden Yellow Hair Dye

[0026]

Perlite	3.00
Nitro para-phenylene diamine	0.30
Para-nitro meta phenylene diamine sulfate	0.10
Para-nitro ortho phenylene diamine	0.10
25% ammonia water	8.00
Lauryl sulfate	1.00
Cetostearyl alcohol	4.00
Pure water	Remainder

Example 9

Brown Hair Dye

[0027]

Perlite	2.00
Toluene-2,5-diamine sulfate	1.10
Resorcin	0.18
5-amino ortho cresol	0.08
Para-amino phenol	0.45
Basic Brown 6	0.01
25% ammonia water	8.00
Lauryl sulfate	1.00
Cetostearyl alcohol	4.00
Pure water	Remainder

[0028] The acidic hair dye of Example 10 and the orange color treatment of Example 11 were applied without the 6% hydrogen peroxide solution. After the hair dye was applied, the results were recorded. Just as in Examples 4-9, in Examples 10-11 no irritation of the scalp was observed, the resulting hair color was similar to the expected hair color, and the dyed hair could be combed easily. In addition, the hair coloring was stable over time.

Example 10

Brown Acidic Hair Dye

[0029]

Perlite	1.00
8-amino-7-para-nitro phenyl azo-2-phenyl azo-1-naphthol-3,6-disulfonic acid disodium salt	0.02
1-hydroxy-4-(ortho sulfo para-toluene)-anthraquinone monosodium salt	0.02
1-para-sulfonyl azo-2-naphthol monosodium salt	0.15
Ethanol	25.0
Benzyl alcohol	10.0
Lactic acid	3.00
Hydroxy ethyl cellulose	0.50
Pure water	Remainder

Example 11

Orange Color Treatment

[0030]

Perlite	0.50
Para-nitro meta phenylene diamine sulfate	0.20
Para-nitro ortho phenylene diamine	0.20
Nitro para-phenylene diamine	0.20
Cetyl trimethyl ammonium chloride	1.00
Cetostearyl alcohol	4.00
Pure water	Remainder

[0031] In alternative embodiments, pitchstone replaced perlite in the same concentration in Examples 1-11 above. The results when pitchstone was used were similar to the results when perlite was used.

[0032] Thus, a hair dye has been disclosed which includes poly-element minerals emit anions and electromagnetic waves to increase the effectiveness of the hair dye and enhances the feel of the hair. In addition to the oxidative, acidic and nitro dyes described above, the hair dye may also include other materials known to be added in hair dyes so long as these do not impair the effect of the present invention. The other materials include, for example, alcohols, fatty acids, silicone, peptides, amino acids, chelating agents, surface active agents, sugars, pilatory agents and perfumes. While variations of the preferred hair dye compositions been disclosed, it would be apparent to those skilled in the art that many more compositions are possible without departing from the inventive concepts herein.

What is claimed is:

1. A hair dye comprising:

a water based hair dye including at least one of an oxidative dye, acidic dye and coloring dye; and

a powder of about 0.01% to 20.0% of the weight of the hair dye, said powder comprising a silicon dioxide based poly-element mineral selected from the group consisting of perlite, pitchstone and tourmaline.

2. The hair dye of claim 1, wherein the hair dye further comprises an oxidative dye of about 0.01% to 5.0% of the weight of the hair dye, the oxidative dye comprising a compound from the group consisting of: 5-amino ortho cresol, ortho amino phenol, ortho chloro para-phenylene diamine, 2-4 diamino phenol, 2,6-diamino pyridine, 4,4'-diamino diphenyl amine, 1,5-dihydroxy naphthalene, diphenyl amine, toluene-2,5-diamine, toluene-3-4-diamine, para-amino phenol, para-phenylene diamine, para-methyl amino phenol, N-phenyl para-phenylene diamine, meta amino phenyl, meta phenylene diamine, resorcin, 2,4-diamino phenoxy ethanol, and any salt thereof.

3. The hair dye of claim 1, wherein the hair dye further comprises an acidic dye of about 0.01% to 5.0% by weight of the hair dye, the acidic dye comprising a compound from the group consisting of: 1-(4-sulfo-1-naphthylazo)-2-naphthol-3,6-disulfonic acid trisodium salt, 9-ortho carboxy phenyl-6-hydroxy-2,4,5,7-tetraiodo-3-iso xantone disodium salt, 1-(4-sulfo-1-naphthylazo)-2- naphthol-6,8-disulfonic acid trisodium salt, 9-(4'-sulfo-2'-sulfonium phenyl)-6-diethyl amino-3-(N,N-dithyl imino)-3-iso xanthyl monosodium salt, 3-carboxyl-5-hydroxy-1-para-sulfonyl-4-para-sulfonyl azo pyrazol trisodium salt, 3-carboxy-5-hydroxy-1-para-sulfonyl-4-para-sulfonyl azo pyrazol disodium salt, 1-para-sulfonyl azo-2-naphthol-6-sulfonic acid disodium salt, 4-{[4-(N-ethyl-meta sulfo benzyl amino)-phenyl]-(2-sulfonium phenyl)-methylene}-[1-(N-ethyl-N-meta sulfo benzyl)-D2,5-cyclohexadiene imine] disodium salt, 1-para-sulfo phenyl azo-2-naphthol monosodium salt, 9-ortho carboxy phenyl-hydroxy-3-iso xanthone disodium salt, 1-hydroxy-3,6,8-pyrene trisulfonic acid trisodium salt, 4-{[4-(N-ethyl-benzyl amino)-phenyl]-(5-hydroxy-4-sulfo-2-sulfophenyl)-methylene}-(N-ethyl-Nbenzyl-D2,5-cyclohexadiene imine) monosodium salt, 2,4-dinitro-1-naphthol-7-sulfonic acid disodium salt, 1-hydroxy-4-(ortho sulfo para-tolueno)-anthraquinone monosodium salt and 8-amino-7-para-nitro phenyl azo-2-phenyl azo-1-naphthol-3,6-sulfonic acid disodium salt.

4. The hair dye of claim 1, wherein the hair dye further comprises a coloring dye of about 0.01% to 5.0% by weight of the hair dye, the coloring dye comprising a compound selected from the group consisting of: 2-nitro para-phenylene diamine, 4-nitro ortho phenylene diamine, 1-amino-2-methyl-6-nitro benzene, 1-amino-2-nitro-4-methyl amino benzene, 4-(2'-hydroxy ethyl)amino-3-nitro-methyl benzene, 1-bis(b-hydroxy ethyl) amino-3-nitro-4-amino benzene, 1-amino-2-(b-hydroxy ethyl)amino-5-nitro benzene, 1-hydroxy-3-nitro-4-(3-hydroxy propyl amino) benzene, N,N'-dimethyl-N-hydroxy ethyl-3-nitro para-phenylene diamine, N-methyl-2-nitro para-phenylene diamine, 3-methyl amino-4-nitro phenoxy ethanol, 2-nitro-5-glyceryl-methyl amine, 1-amino-3-methyl-4-(b-hydroxy ethyl)amino-6-nitro benzene and any salt thereof.

5. The hair dye of claim 4, wherein the coloring dye further comprises a compound selected from the group consisting of: Basic Red 76 (C.I. 12245), Basic Brown 16 (C.I. 12250), Basic Brown 17 (C.I. 12251), Basic Yellow (C.I. 12719), Basic Violet 10 (C.I. 45170) and Basic Blue 99 (C.I. 56059).

6. A method of enhancing the coloring of hair by a hair dye, the method comprising:

mixing a water based hair dye with a powder of about 0.01% to 20.0% of the weight of the hair dye, the powder comprising at least one of a silicon dioxide based poly-element mineral selected from the group consisting of perlite, pitchstone or tourmaline; and

applying the hair dye and powder composition to hair.

7. The method of claim 5, wherein the method further includes mixing an aqueous solution containing hydrogen peroxide and salicylic acid with the hair dye and powder composition before applying the aqueous solution to hair.

* * * * *

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(54) **HAIR CURLER**

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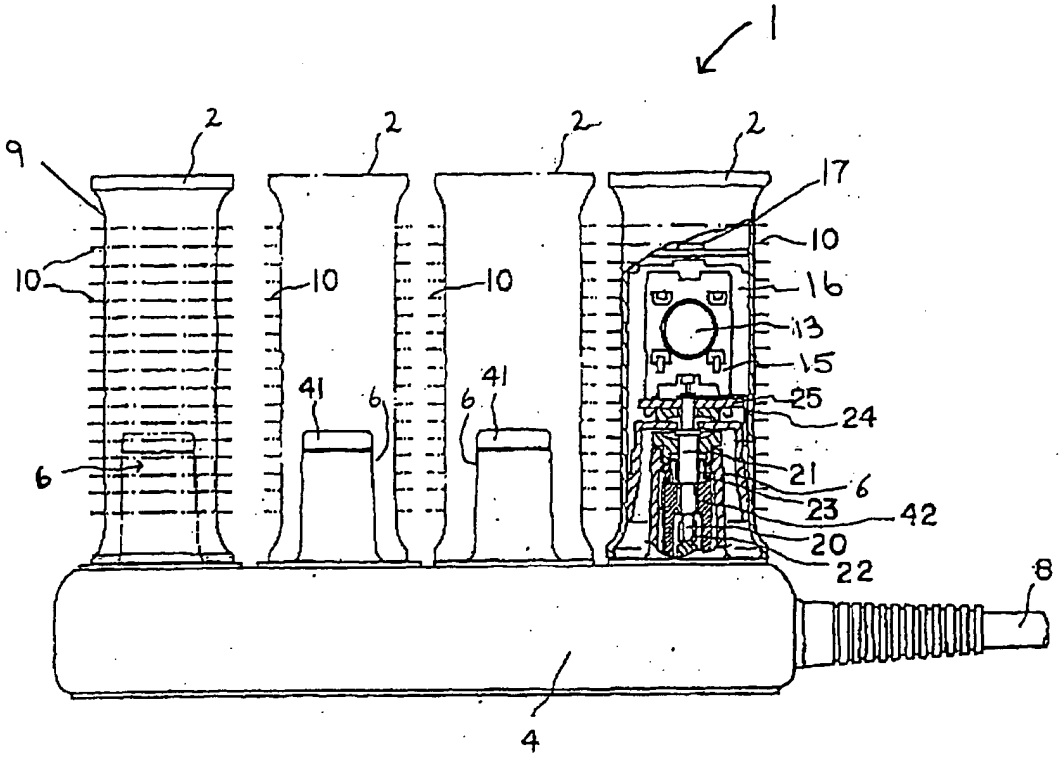
(57) **ABSTRACT**

A hair curler that can rapidly impart a strong, attractive curl without causing damage or loss of shine, and which can reduce setting time. The hair curler has a curler body formed of a heat resistant resin to which are admixed silicon dioxide based multi-element mineral powder, formed by crushing a multi-element mineral, and a far-infrared emitting powder, formed by crushing a far-infrared emitting material.



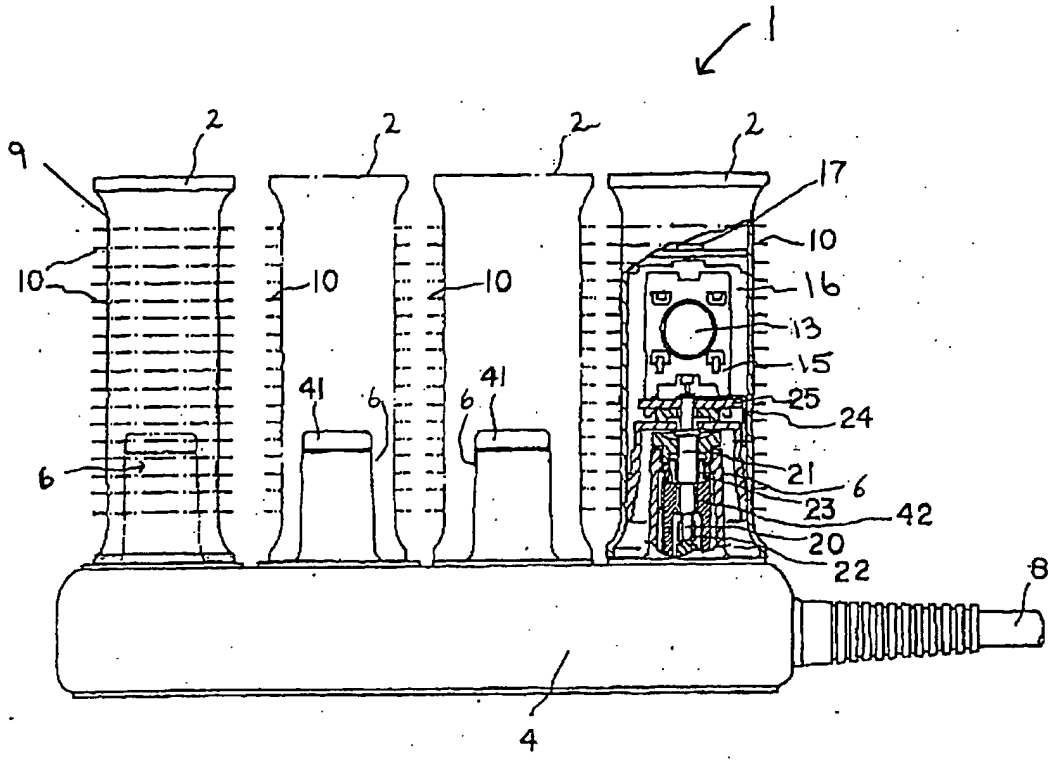


FIG. 1

HAIR CURLER

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present device relates to an improved plug-in type hair curler having an internal heater incorporated within the curler body.

[0003] 2. General Background and State of the Art

[0004] Hair curlers are known which have a cylindrical body with bristles are prongs extending radially outward. These types of hair curlers are heated for example by an electrical current flows through an internal heater which generates heat, and after heating the hair curler body, it is removed from the heater and hair is wrapped around the hair curler and held in place by a pin, so as to impart a curl to the hair (for example, see Unexamined Japanese Utility Model Publication JP-05-28790-U).

[0005] However, as the bodies of such conventional hair curlers were simply formed of plastic, there were problems such that when these were used to impart a curl to the hair, the hair was damaged by the heat, the hair lost shine, and it was difficult to set fine hair. Furthermore, since the thermal retention efficiency of the plastic was poor, it was not possible to reduce the setting time.

[0006] There have been attempts to some of the problems in conventional hair curlers. There exist hair curlers formed of a heat resistant resin to which is admixed a multi-element mineral powder, formed by crushing a multi-element mineral as discussed for example in Examined Japanese Utility Model Publication JP-3045250-U.

[0007] However, even with this hair curler, there was a problem in that the conventional problems were not fully solved.

INVENTION SUMMARY

[0008] As the hair curler of the present device was intended to solve problems associated with conventional hair curlers, an object of the present invention is to provide a novel hair curler having such characteristics as the ability to rapidly impart a strong, attractive curl, while avoiding damage to the hair and loss of shine, as well as reducing setting time, and wherein hair to which a curl has been imparted by the hair curler remains set for a long period of time as compared to conventional curlers.

[0009] The hair curler of the present device is a hair curler of the plug-in type, wherein an internal heater is incorporated in the interior of the curler body; the curler body has a constitution wherein this is formed from a heat resistant resin to which are admixed a multi-element mineral powder, made by crushing a multi-element mineral, and a far-infrared emitting powder, made by crushing a far-infrared emitting material.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] **FIG. 1** is a schematic view illustrating a situation wherein hair curlers according to this mode of embodiment are mounted on the plugs of a hair curler mounting base.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0011] **FIG. 1** is a schematic, partial cross-sectional view illustrating a hair curler assembly **1** according to the invention. The hair curler assembly includes hair curlers **2** mounted on a hair curler mounting base **4**, having a plurality of curler mounts **6** and a power cord **8**.

[0012] In the present invention, the hair curlers **2** have a preferably cylindrical curler body **9** and may include protusions **10** extending radially outward from the curler body **9**. The hair curlers **2** also define a recess **11** designed to fit over and accept the curler mounts **6**.

[0013] The curler body **9** is designed to be rolled into the hair to impart a curl to the hair, and therefore, the curler body **9** is a cylinder formed from a heat resistant resin into which are admixed a multi-element mineral powder, formed by crushing a multi-element mineral, and a far-infrared emitting powder, formed by crushing a far-infrared emitting material. In the present embodiment, a polyester elastomer is used for the heat resistant resin. The plurality of protrusions **10** may be bristles, prongs or ribs, formed at the outer periphery of the curler body **9**.

[0014] In the hair curler **2** of the present device, the curler body is formed from a heat resistant resin to which are admixed a multi-element mineral powder, formed by crushing a multi-element mineral, and a far-infrared emitting powder, formed by crushing a far-infrared emitting material, and therefore, a clustering effect (the size of groups of water molecules is reduced) is produced in the water in the hair as a result of the negative ions emitted by the multi-element mineral, penetration of the hair by water is promoted, outflow of the intracellular substance (matrix) is limited, and the hair is rendered healthy.

[0015] Use of the hair curlers **2** provides effects wherein the hair is made lustrous as a result of negative ions, and the negative ions act on the hair cuticles (glass-like fibers) so that good luster is maintained at all times. This is particularly effective for damaged hair and unmanageable hair.

[0016] The hair curlers **2** emit electromagnetic waves with wavelengths of 4 to 14 μm (weak energy) emitted by the multi-element minerals electrically modify the surroundings of the nuclei of atoms and cause an excited state (oscillation) in the atoms and substances comprising the same. Consequently, water cluster polymers are cleaved and shortened, the volume of the water is reduced, and the specific gravity is increased. This results in sufficient contact of the outer membranes of animal cells by the water (free water), promotes the permeation of the cell by both Ca^{+} and water, and has the effect of activating various cellular functions. Accordingly, this allows for care of the hair.

[0017] The far-infrared emitted from the far-infrared emitting powder heats the hair from the inside. Consequently, penetration of the hair by water is promoted and the hair can be maintained in a healthy state.

[0018] Examples of far-infrared emitting materials include alumina (Al_2O_3), titania (TiO_2), ferrite (Fe_2O_3), chromium oxide (Cr_2O_3), silica (SiO_2), yttria (Y_2O_3), magnesia (MgO).

[0019] The multi-element mineral and the far-infrared emitting material are, for example, powdered by grinding these to 0.5 to 3 microns, and preferably 0.5 to 1 micron in a bowl mill or the like, and this is admixed to a polyester elastomer. The ratio of the multi-element mineral and the far-infrared emitting material to the polyester elastomer is

such that the volume or weight of both powders is between 0.5% and 5% and preferably approximately 1% to 3% of the weight of the polyester elastomer. The powder may be directly admixed to the polyester elastomer, or the powder may be mixed with water, and after heating or pressurization, the supernatant may be directly admixed to the polyester elastomer, or a powder produced by freeze-drying or spray-drying may be admixed to the polyester elastomer.

[0020] The term multi-element mineral refers to minerals comprising a good balance of a plurality of elements, such as pitchstone or perlite, which are composed primarily of silicon dioxide. The multi-element mineral, such as perlite, is ground in a bowl mill or the like to 1 to 3 microns to form a multi-element mineral powder. It is preferable that two or more types of multi-element mineral powders be blended, but one type alone may be used. Note that perlite has the following composition:

TABLE 1

silicon dioxide (SiO_2)	71.94%
aluminum oxide (Al_2O_3)	14.94%
ferrous oxide (Fe_2O_3)	2.54%
magnesium oxide (MgO)	0.44%
calcium oxide (CaO)	2.47%
alkali oxide ($K_2O + Na_2O$)	6.87%
manganese oxide (MnO)	0.03%
phosphoric anhydride (P_2O_5)	0.14%
ignition loss	3.43%
drying loss (at 110° C.)	0.07%
other, titanium	Trace

[0021] The far-infrared emitting material, alumina (Al_2O_3), titania (TiO_2), ferrite (Fe_2O_3), chromium oxide (Cr_2O_3), silica (SiO_2), yttria (Y_2O_3), magnesia (MgO), can be ground to form powders, which can be used singularly or in combinations of two or more.

[0022] The curler mounts **6** are designed to be inserted into the recess **11**, so that the mounting stand **4** can heat the internal heater **13** of the hair curlers **2**. The curler mounts **6** comprises a central conductor **20** and an outer conductor **21**; and these are electrically connected to two heat radiating plates **16** in the hair curlers **2** which serve as electrodes (the front heat radiating plate is not shown in the drawing), which are arranged so as to be in contact with the two sides of the heater **13**, which is fitted in a heater guide **15**. Accordingly, when hair curlers **2** are mounted on the curler mounts **6**, current flows through the heater **13**. Note that, in the figure, reference numeral **22** indicates a terminal for the central conductor **20**, reference numeral **23** indicates a terminal for the outer conductor **21**, and reference numeral **24** indicates a connecting plate which connects the central conductor **21** to one of the heat radiating plates **16**. The connecting plate that connects the outer conductor **21** and the other heat radiating plate is not shown. Reference numeral **25** indicates a plug caulking mount.

[0023] The heater **13** serves to heat the curler body **9**. In the present embodiment, a PTC thermistor is used as heater **13**. Note that, in the drawing, reference numeral indicates a cap for the curler mount **6**. A thermolabel **17** is provided in the hair curlers **2** which displays when the curler body **9** has reached a suitable temperature, for example, thermolabel **17** is red before heating and turns black after heating.

[0024] Thus, when the hair curlers **2** according to the present embodiment are used, as shown in **FIG. 1**, the hair curlers **2** are placed on the curler mounts **6** of the hair curler mounting stand **4** so that electrical current flows through the heater **13**, and the hair curlers **2** are heated to a predetermined temperature. Next, when the hair curlers **2** reach the predetermined temperature, the hair curlers **2** are removed, rolled into the hair, and fixed with a pin (not shown) to impart a curl.

[0025] In the hair curlers **2** of the present embodiment, the curler body **9** is formed from a polyester elastomer to which is admixed a multi-element mineral powder, formed by crushing a multi-element mineral, and a far-infrared emitting powder, formed by crushing a far-infrared emitting material, and therefore, negative ions, weak energy, and far infrared are generated from the curler body **9**; this reduces the size of the groups of molecules in the water so that it penetrates deep within the hair, whereby the moisture balance of the hair is adjusted so that the condition thereof approaches a healthy state and a strong and attractive curl can be imparted. As a result of activation of proteins in the hair by the action of the negative ions, the weak energy, and the far infrared, the hair can be constantly maintained in a healthy state. As the thermal efficiency can be increased by the action of the negative ions, the weak energy, and the far infrared, and thereby the setting time can be reduced. Furthermore, negative ions, weak energy, and far infrared act to reduce the size of the groups of molecules in the water so that it penetrates deep within the hair, thus reducing static electricity and maintaining shiny hair. Furthermore, negative ions, weak energy, and far infrared act so that it is possible to impart an attractive curl to hair that has been damaged by excessive use of hair coloring, permanent wave treatments, and hair dryers, and to fine hair that is difficult to set.

[0026] Above, a mode of embodiment of the present device has been described, but the specific constitution of the present device is not limited to this mode of embodiment, and the present device can include modifications without departing from the scope and the spirit of the device.

[0027] As described above, in the hair curler of the present device, the curler body **9** is formed from a heat resistant resin to which are admixed multi-element mineral powder, formed by crushing a multi-element mineral, and far-infrared emitting powder, formed by crushing a far-infrared emitting material, whereby negative ions, weak energy, and far infrared are generated from the curler body, which mineralize the water in the hair and activate the proteins in the hair so that the hair is constantly healthy and shiny. The negative ions, weak energy, and far infrared act to reduce the size of the groups of molecules in the water so that it penetrates deep within the hair, whereby the moisture balance of the hair is adjusted so that the condition thereof approaches a healthy state, and a strong and attractive curl can be imparted. As the thermal efficiency can be increased by the action of the negative ions, the weak energy, and the far infrared, the setting time can be reduced. Furthermore, negative ions, weak energy, and far infrared act to reduce the size of the groups of molecules in the water so that it penetrates deep within the hair, thus reducing static electricity and maintaining shiny hair.

What is claimed is:

1. A hair curler of the type wherein an internal heater is incorporated within a curler body, comprising:

a curler body formed of a heat resistant resin to which are admixed a silicon dioxide based multi-element mineral powder, formed by crushing a multi-element mineral, and a far-infrared emitting powder, formed by crushing a far-infrared emitting material.

2. The hair curler of claim 1 further comprising:

a cylindrical curler body;

a plurality of protrusions extending radially from said cylindrical curler body;

said curler body and said protrusions formed from said heat resistant resin and mineral powder admixture.

3. The hair curler of claim 2, further comprising:

an internal heater mounted within said cylindrical curler body.

4. The hair curler of claim 3, further comprising:

a thermolabel on said cylinder, said thermolabel being an indicator of the temperature of said hair curler.

5. The hair curler of claim 1 wherein said heat resistant resin is a polyester elastomer.

6. The hair curler of claim 1 wherein said heat resistant resin is mixed with between about 0.5% and 5% by weight of said multi-element mineral powder and far-infrared emitting powder.

7. The hair curler of claim 1 wherein said heat resistant resin is mixed with between about 0.1% and 3% by weight of said multi-element mineral/powder and far-infrared emitting powder.

8. A hair curler comprising:

a cylindrical curler body having a plurality of radially extending protrusions, said cylindrical curler body formed from a mixture of a heat resistant polyester elastomer blended with 0.5% to 5% by weight of a powder, said powder consisting of at least one of a silicon dioxide based polyelement mineral powder and a far infrared emitting powder; and

an internal mounted within said cylindrical curler body.

9. The hair curler of claim 8, further comprising:

a thermolabel on said cylinder, said thermolabel being an indicator of the temperature of said hair curler.

* * * * *

US006936557B2

(12) **United States Patent**
Park

(10) **Patent No.: US 6,936,557 B2**
(45) **Date of Patent: Aug. 30, 2005**

(54) **MINERAL COMPOSITION AND METHOD FOR MANUFACTURING THE SAME**

(76) Inventor: **Yong-Jin Park**, Baeknam Bldg., 988, Dunsan-dong, Seo-ku, Daejeon-city (KR)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 170 days.

(21) Appl. No.: **10/154,817**

(22) Filed: **May 28, 2002**

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(30) **Foreign Application Priority Data**

Mar. 14, 2002 (KR) 2002-13685

(51) **Int. Cl.**[7] **C30B 29/34**; C04B 35/18

(52) **U.S. Cl.** **501/86**; 501/128; 501/141; 264/671; 252/587

(58) **Field of Search** 501/86, 126, 127, 501/141, 128; 264/671; 252/587

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Primary Examiner—Karl Group
(74) *Attorney, Agent, or Firm*—Robert E. Bushnell, Esq.

(57) **ABSTRACT**

A novel multipurpose mineral composition capable of emitting a large quantity of far infrared rays, negative ions and oxygen heat is manufactured by setting up an iron railing, an iron rod and an iron plate on a brazier, placing a tinfoil on the iron plate, and layering yellow soil, kaolin, sericite, and biomineral in sequence on the tinfoil, while inserting the tinfoil between the layers, loading a pulverized elvan in the furnace, pulverizing a mixed stone including 40 wt % of germanium, 15 wt % of tourmaline, 30 wt % of zeolite, and 15 wt % of franklinite, to the particle size under about 44 μm, and loading the pulverized mixed stone in an internal furnace which is made by winding a copper plate with a tinfoil and placed on the plurality of layers of the furnace, heating the pulverized mixed stone at about 1,000° C. for about seven days into a lump, and repulverizing the lump.

20 Claims, 2 Drawing Sheets

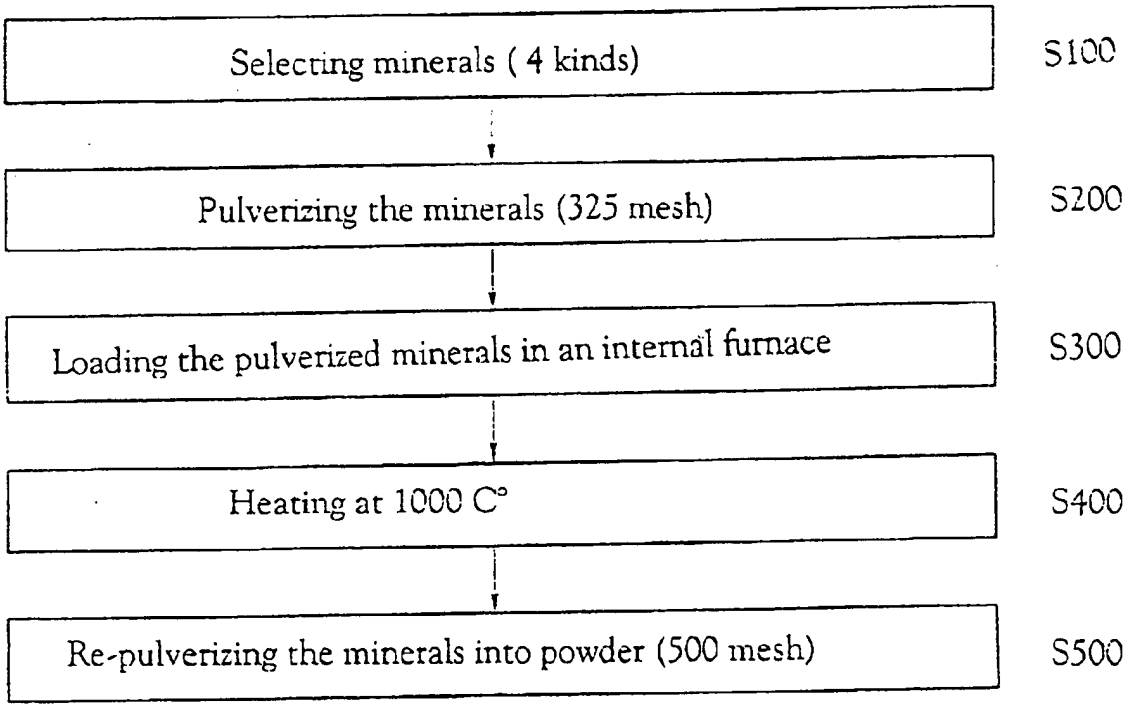


FIG. 1

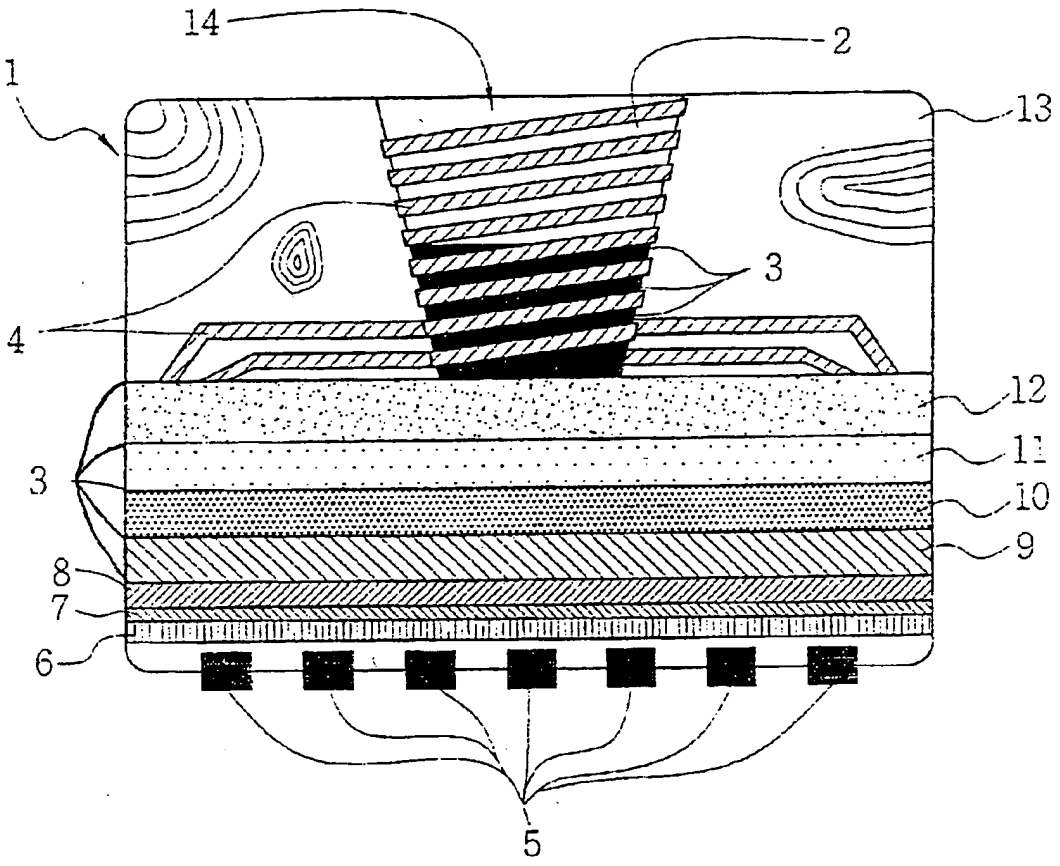
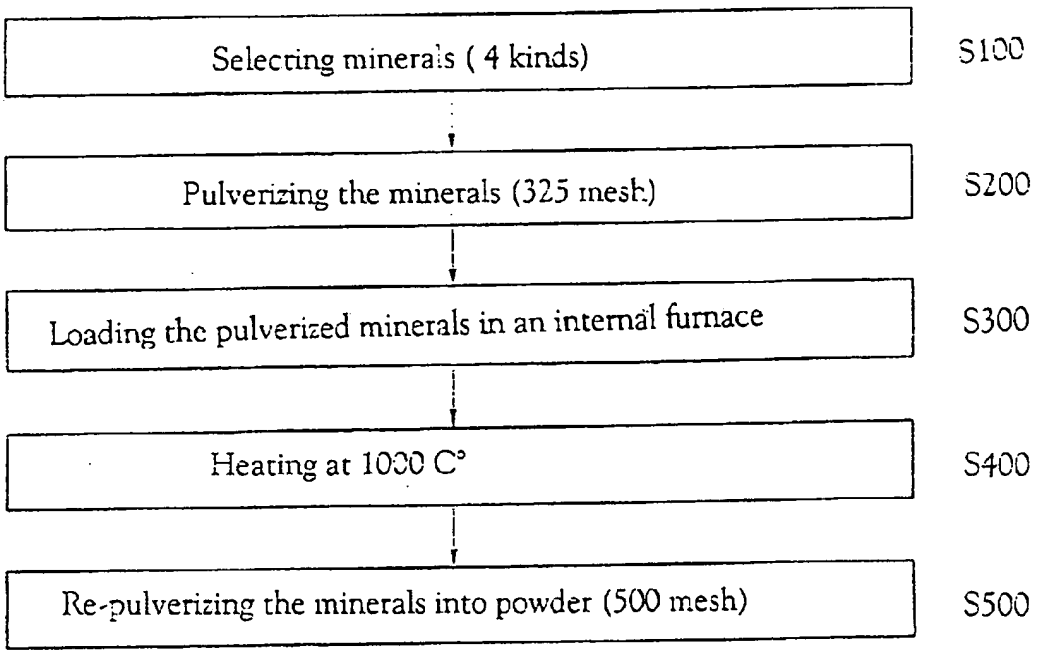


FIG. 2


Selecting minerals (4 kinds)
S100
Pulverizing the minerals (325 mesh)
S200
Loading the pulverized minerals in an internal furnace
S300
Heating at 1000 C°
S400
Re-pulverizing the minerals into powder (500 mesh)
S500

MINERAL COMPOSITION AND METHOD FOR MANUFACTURING THE SAME

CLAIM OF PRIORITY

This application makes reference to, incorporates the same herein, and claims all benefits accruing under 35 U.S.C. §119 from my application entitled NEW MULTI-PURPOSE MIRACLE POWDER AND METHOD FOR MANUFACTURING THE SAME filed with the Korean Industrial Property Office on Mar. 14, 2002 and there duly assigned Serial No. 2002-0013685.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally relates to a novel multi-purpose mineral composition emitting a large quantity of far infrared rays, negative ion and oxygen heat, and a method for manufacturing the same.

2. Description of the Related Art

It has been for a while since a variety of mineral powders capable of emitting far infrared rays and negative ions were manufactured. However, most of them use more than five different kinds of natural stones, take a very long time to heat, and require much energy and time to manufacture, which naturally made them very expensive and low in comparability.

More specifically, mineral, zeolite, green jade, amen-tree stone, and germanium were pulverized and put in the internal furnace, and zeolite was filled in-between the furnace and the internal furnace for 9-day heating before it was pulverized to manufacture the mineral powder. In another case, the internal furnace was made of amen-tree stone, and the mixed mineral powder including germanium, blackdiamond, jade, white gem and zeolite was put into the internal furnace and heated for at least nine days before the mixture was pulverized to manufacture the mineral powder emitting far infrared rays. Unfortunately however, such traditional methods proved to be problematical in many ways. First of all, the raw stone was very expensive, and many kinds of the raw stone were needed. Also, the heating time was very long requiring a great amount of time and energy, which consequently increased the manufacturing cost of the mineral powder overall.

SUMMARY OF THE INVENTION

It is, therefore, an object of the present invention to provide a novel multipurpose mineral composition with a very low price and easy access for the public, thereby contributing to human health in general.

It is also an object of the present invention to provide a method for manufacturing the novel multipurpose mineral.

In accordance with the present invention, these objects are accomplished by using a modified furnace and four kinds of natural stones that are low in price and easy to get, in which the resultant product demonstrates the similar physical properties with the traditional mineral powder despite a short heating time.

The present invention is directed to a novel mineral composition and a method for manufacturing the novel mineral composition that comprises the steps of setting up a base of a first furnace, setting up a second furnace on the base of the first furnace, loading a pulverized elvan in the first furnace, pulverizing a mixed stone comprising

germanium, tourmaline, zeolite, and franklinite, loading the pulverized mixed stone in the second furnace, heating and burning the pulverized mixed stone at approximately 1,000° C. for about seven days into a lump, and repulverizing the lump.

The resultant mineral composition includes silicon, aluminum, iron, calcium, magnesium, potassium, sodium, and titanium.

It is preferred that the resultant mineral composition is as small as a particle can be passed through a number 500-mesh screen.

The pulverized mixed stones comprises about 40 wt % of the germanium, about 15 wt % of the tourmaline, about 30 wt % of said the zeolite, and about 15 wt % of the franklinite.

BRIEF DESCRIPTION OF THE DRAWINGS

A more complete appreciation of the invention, and many of the attendant advantages thereof, will be readily apparent as the same becomes better understood by reference to the following detailed description when considered in conjunction with the accompanying drawings in which like reference symbols indicate the same or similar components, wherein:

FIG. **1** is a schematic diagram illustrating a furnace for manufacturing multipurpose mineral powder according to the present invention; and

FIG. **2** is a block diagram illustrating a manufacturing process of the multipurpose mineral powder according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention will be described herein below with reference to the accompanying drawings and experiments.

Referring to FIG. **1**, a furnace **1** for manufacturing a novel multipurpose mineral powder according to the present invention includes a brazier **5**, a substrate formed of an iron railing **6**, an iron rod **7**, and an iron plate **8** on the brazier **5**, a tinfoil **3** on the substrate, and a plurality of layers which includes the layers of yellow soil **9**, kaolin **10**, sericite **11**, and biomineral **12** in sequence on the tinfoil **3**. Each layer preferably has the same weight. Preferably, the base of the furnace **1** is made by inserting the tinfoil **3** on the top portion of every layer, and an internal furnace **2** is mounted on the top of the base. Then, pulverized elvan **13**, the particle size of which is preferably under about 74 μm (the particle that passes a U.S. #200-mesh screen), is loaded in the furnace **1** so that the pulverized elvan surrounds the internal furnace **2**. The internal furnace **2** can be prepared by wrapping a copper plate with the tinfoil **3** and by winding its external surface with a gas pipe **4** which is connected to a biomineral layer **12** and is preferably made by winding a copper wire with the tinfoil. The tinfoil **3** is also put on an inner surface and an external surface at the lower portion of the internal furnace **2**.

Later, the mixture of about 40 weight % (wt %) of germanium, about 15 wt % of tourmaline, about 30 wt % of zeolite and about 15 wt % of franklinite (**S100** in FIG. **2**) is pulverized to the particle size under about 44 μm (the particle that passes a U.S. #325-mesh screen), in a pulverizer (**S200** in FIG. **2**) and loaded into the internal furnace **2** (**S300** in FIG. **3**). This pulverized mixture is then heated approximately at 1,000° C. for about seven days through the brazier **5** (**S400** in FIG. **2**). Since the elvan **13** starts to heat at the initial temperature, about 1,000° C. and generates its own

combustion heat by external heat, the four-component mineral powder in the internal furnace **2** experiences beat denaturation due to the high heat. In consequence, the hazardous heavy metals to the human body are burned or disappeared, and, as shown in TABLE 1, the mineral powder becomes a lump having natural mineral as main component. This lump is again pulverized until the particles of the lump can be passed through a number 500-mesh screen (S500 in FIG. 2), and the desired mineral powder is obtained therefrom.

TABLE 1

Test Item		Results
Qualitative Analysis		Detected 8 elements: Si, Al, Fe, Ca, Mg, K, Na, Ti
Quantitative Analysis	SiO_2	79.3 wt %
	Al_2O_3	12.4 wt %
	Fe_2O_3	1.13 wt %
	CaO	0.26 wt %
	MgO	0.20 wt %
	K_2O	3.05 wt %
	Na_2O	0.65 wt %
	TiO_2	0.13 wt %
	Loss on Ignition	2.62 wt %
	Ge	1.17 mg/kg

TABLE 1 shows the experimental results of the resultant mineral powder. The mineral powder emits a large quantity of far infrared rays, negative ions, and oxygen heat that are very good for the human body.

For a better understanding, the invention is further illustrated by the following example, which is not limitative.

EXAMPLE

As an embodiment of the present invention, a furnace **1** which is 100 meter long and 4.5 meter wide is first made. The gas braziers **5** are spaced from each other by one meter, and an iron railing **6** is erected thereon to allow the gas braziers **5** access to the furnace. On the iron railing **6**, iron rods **7** are arranged one meter apart in length and width from each other. On the iron rods **7**, iron plate **8** at least 0.25 cm thick is placed, and a tinfoil **3** is put on the top of the iron plate **8**. Then, each of the layers of yellow soil **9**, kaolin **10**, sericite **11**, and biomineral **12**, having the tinfoil **3** between two layers, are placed in sequence to make the base of the furnace **1**. Each layer is 10 ton in weight. Here, the tinfoil **3** is put on the biomineral **12** which is connected to a gas pipe **4**, where the gas pipe **4** is made by winding the copper wire with the tinfoil. The gas pipe **4** winds around the internal furnace **2** whose inner wall is coated with the tinfoil. In the meantime, a pulverized elvan **13** is loaded between an inner surface of the furnace **1** and the outer surface of the internal furnace **2**, and the internal furnace **2** is filled with 7,200 kg of the mixture of 40 wt % of germanium, 15 wt % of tourmaline, 30 wt % of zeolite, and 15 wt % of franklinite by pulverizing the mixture in a pulverizer to make smaller powder the size of which is below about 44 μm. Through the gas braziers **5**, the mixture is heated at about 1,000° C. for about seven days and is cooled. The cooled powder is again put into the pulverizer until its size becomes as small as the powder can be passed through a number 500-mesh screen, and 7000 kg of the novel natural mineral powder is obtained. The physical properties of the powder are pretty much similar to those in TABLE 1. When the far infrared ray applicability evaluation test is conducted, the present sample emitted 63 ion/cc, and had 0.921 of emissivity at a wavelength between 5 and 20mm, and its radiation energy is 3.72×10^2 W/m^3.

In addition, the mineral powder of the present invention showed no clinical symptom of harming the skin when an epispastic test is performed. Further, the dermal toxicity test results assured that the mineral powder of the present invention is very safe and good for the human body, exhibiting no clinical symptom or pathological opinion related to death, when 5 g/kgB.W of the sample, the highest possible concentration for the novel mineral substance, is applied to the derma

In conclusion, as shown in TABLE 1, the novel mineral powder and its manufacturing method of the present invention proved to be very advantageous not only the multipurpose mineral powder emits a large quantity of far infrared rays, negative ions and oxygen heat that are good for the human body, but also the manufacturing method saves a great deal of energy and time yet manifesting superior effect to the conventional method.

While the invention has been shown and described with reference to certain preferred embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention as defined by the appended claims.

What is claimed is:

1. A method for manufacturing a mineral composition, the method comprising the steps of:

setting up a base of a first furnace;

setting up a second furnace on said base of said first furnace;

loading a pulverized elvan into said first furnace;

pulverizing a mixed stone comprising germanium, tourmaline, zeolite, and franklinite;

loading the pulverized mixed stone into said second furnace;

heating and burning the pulverized mixed stone at approximately 1,000° C. for about seven days to a lump; and

repulverizing said lump.

2. The method of claim **1**, said step of setting up the base, comprising the steps of:

setting up a brazier;

setting up a substrate of said first furnace on said brazier;

placing a first tinfoil on said substrate; and

layering a plurality of layers comprising layers of yellow soil, kaolin, sericite, and biomineral in sequence, on said first tinfoil, while putting a second tinfoil on each of said plurality of layers.

3. The method of claim **2**, said step of setting up the substrate, comprising the step of setting up an iron railing, an iron rod and an iron plate on said brazier.

4. The method of claim **2**, said step of setting up the second furnace, comprising the steps of:

wrapping a copper plate with a third tinfoil;

putting a fourth tinfoil on an inner surface of said second furnace and an external surface at a lower portion of said second furnace; and

winding the external surface of said second furnace with a gas pipe connected to said biomineral layer.

5. The method of claim **2**, each of said plurality of layers being 10 tons in weight.

6. The method of claim **4**, wherein said gas pipe is made by winding a copper wire and the tinfoil.

7. The method of claim 2, wherein said brazier is a gas brazier.

8. The method of claim 1, a particle size of said pulverized elvan being under about 74 μm.

9. The method of claim 1, said pulverized mixed stones comprising about 40 wt % of said germanium, about 15 wt % of said tourmaline, about 30 wt % of said zeolite, and about 15 wt % of said franklinite.

10. The method of claim 1, a particle size of said pulverized mixed stone being under about 44 μm.

11. The method of claim 1, wherein a particle of the repulverized lump is as small as said particle can be passed through a number 500-mesh screen.

12. The method of claim 1, further comprising, before the step of repulverizing, the step of cooling said lump.

13. The mineral composition manufactured by the method of claim 1.

14. The mineral composition manufactured by the method of claim 9.

15. The mineral composition manufactured by the method of claim 11.

16. A method for manufacturing a mineral composition, the method comprising the steps of:

pulverizing a mixed stone comprising germanium, tourmaline, zeolite, and franklinite; and

heating and burning the pulverized mixed stone in a furnace loaded with elvan.

17. The method of claim 16, further comprising the step of repulverizing the burned mixed stone.

18. The mineral composition manufactured by the method of claim 16.

19. A method for manufacturing a mineral composition, comprising the steps of:

preparing pulverized mixed stones comprising about 40 wt % of said germanium, about 15 wt % of said tourmaline, about 30 wt % of said zeolite, and about 15 wt % of said franklinite;

heating and burning the pulverized mixed stone in a furnace loaded with elvan; and

pulverizing the burned mixed stone.

20. The mineral composition manufactured by the method of claim 19.

* * * * *

United States Patent [19]

Roller

[11] **Patent Number: 4,857,306**

[45] **Date of Patent: Aug. 15, 1989**

[54] **COSMETIC COMPOSITION, PARTICULARLY FOR DECORATIVE APPLICATIONS**

[76] Inventor: **Joachim Roller, Blumenstrasse 7A, Neustetten 1, Fed. Rep. of Germany, D-7401**

[21] Appl. No.: **45,132**

[22] PCT Filed: **Aug. 29, 1986**

[86] PCT No.: **PCT/DE86/00347**

§ 371 Date: **Jun. 15, 1987**

§ 102(e) Date: **Jun. 15, 1987**

[87] PCT Pub. No.: **WO87/01278**

PCT Pub. Date: **Mar. 12, 1987**

[30] **Foreign Application Priority Data**

Aug. 29, 1985 [DE] Fed. Rep. of Germany 3530902

[51] **Int. Cl.**[4] **A61K 7/021; A61K 7/027; A61K 7/031; A61K 7/032**

[52] **U.S. Cl.** **424/63; 424/61; 424/64; 424/69; 514/844; 514/845; 106/401; 106/504**

[58] **Field of Search** ..... **424/61, 63, 64, 69; 106/288 B, 307, 316, 401, 415, 450, 499, 504**

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Primary Examiner—Ellis P. Robinson
Assistant Examiner—Susan S. Rucker
Attorney, Agent, or Firm—Bachman & LaPointe

[57] **ABSTRACT**

The invention relates to a cosmetic composition, particularly for decorative applications, with a proportional content of a liquid, highly viscous or solid, dermatologically compatible carrier material and a pure powder of precious stones or precious stone mixtures.

11 Claims, No Drawings

COSMETIC COMPOSITION, PARTICULARLY FOR DECORATIVE APPLICATIONS

The present invention relates to a cosmetic composition, particularly for decorative applications. Decorative cosmetics mostly involve carrier materials compounded with dyes or pigments which are intended to place coloured accents in the wearers' faces, on their hairstyle, etc. Typical decorative cosmetics products are nail polishes, eye shadows, lipsticks, powders—both for the face and the body—hair sprays, and the like. Recently allergic reactions have occurred to the wearers to a very high degree in relation to such compositions, particularly when dyes or carrier materials are used which are suited to act as nutrient media for bacteria and colonization of micro-organisms or which may age due to simple chemical decomposition, e.g. under the effects of light, when the products are allowed to stand for an extended period of time, thus producing decomposition products which may cause allergies.

Another disadvantage of known decorative cosmetic products is their only very restricted period of usefulness and their frequent sensitivity to temperature; this is the reason why storage in specialized cosmetics shops is not unproblematic.

Extensive tests on animals even are not suited to predict undubitably such allergic reactions as those which may be caused particularly by decomposition arising from extended or inadequate storage.

Moreover, there is an ever-increasing demand for particularly lustrous reflecting cosmetic colours for evening events or for the makeup of actors, with the demands to luster and high reflectivity not being satisifed in this field by the common organic dyes or even the normal inorganic minerals.

The problem underlying the present invention is thus the provision of an improved cosmetic composition which will employ dyes which are better to tolerate and afford better optical effects.

According to the present invention, this problem is solved by a composition comprising a liquid, highly viscous or a solid, dermatologically compatible carrier material and a pure powder of precious stones or mixtures of precious stones. If necessary, incinerated precious stones may be used.

The composition may, of course, contain a perfume component as usual in cosmetics.

In a preferred embodiment precious stone powder is added into a carrier liquid in which it is emulsified or emulsifiable, if necessary by means of the addition of emulsion stabilizers. Such liquids are suitable, for instance, for liquid eye shadows, liquid lip gloss, nail polishes and the like.

It has proven to be expedient for other preferred applications to use the inventive composition in a highly viscous salve-like carrier material desirable for applications such as creamy eye shadows, soft lipsticks, creamy lip gloss and similar products. It turned out that eucerine or VASELINE® are specifically well suited as stable carrier materials.

Silicic acid may also be added as an additional auxiliary product.

Another preferred embodiment of the inventive composition is a mixture of precious stone powder with powder bases known per se, such as powdered soapstone or talcum powder. These powders may be used as lustrous makeup or lustrous talcum powder either in a loose or cake form.

The inventive decorative compositions contain the precious stone powder in quantities by up to 10% in weight, preferably by roughly 5% by weight. Depending on the respective application, however, the quantity may also be increased or reduced.

Due to purely mineral crystallized compounds being used as dyes, which are moreover very hard and, due to the missing surface pores, are not suited to form nutrient media for bacteria allergic reactions to these coloring materials may practically be precluded.

Earth or mineral colors such as clays, which have so far been used, are a really ideal nutrient medium for bacteria due to their porous surface.

But organic dyes, too, which are used, for instance, in combination with metal powders for eye shadows, have frequently resulted in allergic reactions to the dyes themselves or to by-products of reactions, which adhered to them.

The following materials have so far proven themselves to be suited as "precious stones", this list, however, not being an exclusive and complete enumeration: sapphire, ruby, emerald, gem topaz, moonstone, cat's eye, zirconium, rock crystal, agate, amethyst, aquamarine, aventurine, amber, beryl, bloodstone, chrysoberyl, chrysoprase, chrysolite, chrysocolla, chalcedony, dioptase, fire opal, fluorite, garnet, oriental topaz, hyacinth, hematite, jade, cornelian, lapis lazuli, labradorite, malachite, nephrite, onyx, opal, obsidian, padparsha, peridot, rhodolite, rhodochrosite, rubellite, blue quartz, sodalite, spinel, sardonyx, tansanite, topaz, tourmaline, tiger's-eye, zoisite, turquoise, Chile-lapis, quartz, smoky quartz, and jasper. Corals and pearls could be expediently employed as well to produce cosmetic compositions with a nacreous luster so that in this context corals and pearls will be referred to as precious stones as well.

Apart from its good compatibility, the inventive decorative cosmetics product is characterized by an extreme purity of colour, brilliance and luster as it is demanded for actors' makeup specifically in the present-day frequent use of lasers on the stage.

The invention will be explained in more detail in the following with reference to examples:

EXAMPLE 1

Powder eye shadow

100 g malachite were crushed in a precious stone mill, a commercially available agate grinder, for 4 hours. The precious stone powder thus obtained had a particle size distribution between 0.0005 and 0.003 millimeters=0.5 to 3 micron. 5 g of the malachite powder were homogeneously kneaded together with 95 g eucerine cum aqua in a kneading machine and the resulting mixture was filled into jars. The result was a very well adhesive, strongly shiny and reflecting green eye shadow.

EXAMPLE 2

10 g lapis were crushed into powder as described in Example 1 above, and kneaded with 90 g VASELINE® in a kneader. The resulting mixture was filled into jars and furnished a lustrous eye shadow of blue color.

EXAMPLE 3

Powder eye shadow

80 g finely powdered talcum, 10 g highly pure silicon dioxide, as well as 10 g of ground turquoise were homogenously intermixed in a mixer. Then the powder mixture was pressed into a powder cake. The result was a turquoise eye shadow of intensive coloring.

EXAMPLE 4

Talcum powder

90 g of powdered soapstone as well as 5 g of crushed corals were homogenously mixed with 5 g of silicon dioxide and filled as loose powder of "angels' skin" coloring.

EXAMPLE 5

10 g of lapis, 10 g of sapphire, 10 g of turquoise and 70 g of azurite powder were homogenously mixed with 100 g VASELINE ® in a kneading machine. The result was an intensively light-blue creamy eye shadow which when filled into jars has a nearly unlimited durability.

I claim:

1. Cosmetic composition, particularly for decorative applications, characterized by a liquid, highly viscous or solid, dermatologically compatible carrier material and a pure powder of precious stones selected from the group consisting of sapphire, ruby, emerald, gem topaz, moonstone, cat's eye, zirconium, rock crystal, agate, amethyst, aquamarine, aventurine, amber, beryl, bloodstone, chrysoberyl, chrysoprase, chrysolite, chrysocolla, chalcedony, dioptase, fire opal, fluorite, garnet, oriental topaz, hyacinth, hematite, jade, cornelian, lapis lazuli, labradorite, malachite, nephrite, onyx, opal, obsidian, padparsha, peridot, rhodolite, rhodochrosite, rubellite, blue quartz, sodalite, spinel, sardonyx, tansanite, topaz, tourmaline, tiger's-eye, zoisite, turquoise, Chile-lapis, quartz, smoky quartz, jasper, corals, pearls and mixtures thereof.

2. Composition according to claim 1, characterized by a precious stone concentration of up to 10% by weight.

3. Composition according to claim 2, characterized by a precious stone concentration of 2-8% by weight.

4. Composition according to claim 2, characterized by a precious stone concentration of 5% by weight.

5. Composition according to claim 1, characterized in that precious stone powders with particle sizes between 0.0005 and 0.003 mm are employed.

6. Composition according to any one of claims 1, 2 or 5, characterized in that the carrier material is liquid, preferably easily drying, with the precious stone powder being emulsified or emulsifiable in the liquid, if necessary by addition of emulsion stabilizers.

7. Composition according to claim 1, characterized in that the carrier material is a dermatologically compatible salve base known per se.

8. Composition according to claim 7, characterized in that the salve base comprises eucerine or VASELINE ®.

9. Composition according to claim 1, characterized in that the carrier material is in powder form.

10. Composition according to claim 9, characterized in that the carrier material is powdered soapstone or gypsum.

11. Composition according to claim 9 or 10, characterized in thst the carrier material is mixed with the precious stone powder and that the mixture is pressed into a cake form.

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(54) COMPOSITE MATERIAL AND METHOD FOR PREPARING THE SAME, AND RAW COMPOSITE MATERIAL USED FOR PREPARING THE SAME

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(57) ABSTRACT

The invention relates to an improvement in tourmaline known as a functional ore. In particular, the invention provides a composite having a novel formation in which a far infrared radiation function and others among tourmaline's functions are effectively exploited, a novel process for producing the composite, and composite materials to be used therefore. The invention includes the composite combining and integrating the tourmaline powder with the magnetic body so that a laminated or racernic structure is formed, the process for the production of the composite producing a molded body having a racemic structure composed of the tourmaline powder and magnetic powder by homogenously mixing and stirring the tourmaline powder with the unmagnetized powder, solidifying or freezing by an appropriate means to form a molded body and subsequently magnetizing the unmagnetized powder, and a coating liquid form of the composite material composed of the tourmaline and unmagnetized powder to be used for the composite of the invention and the process for the production thereof wherein the tourmaline powder, together with an appropriate adhesive, are homogenously mixed and stirred with the unrriagnetized powder to form the coating liquid having a racemic structure and finally the unmagnetized powder in the coating liquid are magnetized.

COMPOSITE MATERIAL AND METHOD FOR PREPARING THE SAME, AND RAW COMPOSITE MATERIAL USED FOR PREPARING THE SAME

TECHNICAL FIELD

[0001] This invention relates to an improvement in tourmaline known as functional mineral ores, and in particular, provides a composite having a new formation by which far infrared ray emission function among their functions can be effectively utilized, a novel process for producing the composite, and composite materials to be used therefore.

BACKGROUND ART

[0002] While modern society seems to sing in praise of economic prosperity dependent upon the advances of scientific technology, due to too rapid technical innovation, living environments have become extremely complex and diversified. Suffering from feelings of depression or anxiety that a humanly natural life may not be maintained, individuals have been undergoing stresses, though they are not aware of it, and have lived a life with so-called all the modem illnesses such as stiff necks, dizziness, lower back problems, autonomic nerve imbalances and the like. As a result, many people have, in fact, had headaches, insomnia, dizziness, etc. without obvious causes, got easily tired due to gastrointestinal function disorders or stifled, suffered from palpitation or eye fatigue, or experienced abnormal perspiration on the palms of their hands or under their arms.

[0003] In addition to these symptoms which can only be attributed to a breakdown in the human psychological balance, in modern societies, in normal daily lives, many people suffer from another physical disorders caused by environments surrounding them.

[0004] That is, modern people are concentrated in urban areas, walk on hard-surface roads, and are forced to live in lives surrounded by substances which are sources of positive ions, such as automobiles, electric appliances, buildings of inorganic substances, chemical products such as garments, accessories, etc., and polluted air containing synthetic substances such as toxic gases and so on. Thus, positive ions have been excessively accumulated in human bodies which are apt to lose psychological balance, whereby people must live with predisposed acidity, which is abnormal in nature, for quite a long time.

[0005] Originally, normal cells, on cell membranes, retain positive potentials outside cell membranes and negative potentials inside cell membranes, and the negative potential inside of the cell membrane is always maintained higher than the positive potential outside of the cell membrane so as to generate potential differences inside and outside of a cell membrane. This excretes metabolic waste products of a cell and facilitates metabolism in maintaining a healthy body.

[0006] But, when the potential balance inside and outside of a cell membrane is, in its environment, disrupted by excessive positive ions, smooth metabolism by the potential differences is inhibited and it results in reduced functions of each cell and abnormal actions in physiological active functions of body. As a result, aging of skin such as rough skin, spots, fine wrinkles, etc. is disadvantageously progressed, or various diseases of internal organs such as hypertension, hypotension, arteriosclerosis, allergy disorders, rheumatoid, nerve pain, cerebral stroke, cardiac disease, cancers and the like are likely to be induced bringing physiological pain. When all is taken into consideration, it is true that modem people have become exposed to extremely disadvantaged environments both physiologically and psychologically.

[0007] Therefore, before singing in praise of affluent lifestyles, it seems necessary for modern people to recognize stress levels accurately and treat stress appropriately in its early stages as well as to suppress occurrence and intake of positive ions into the body and incorporate negative ions actively from outside body, in order to increase negative ions in the body and facilitate metabolism of cells. For such stress control, as psychological treatments, for example, aromatherapy and hot spring therapy which can be taken easily by oneself and rather exclusive therapies such as hypnotic cures have been recognized, and their active exploitation is recommended, while, as physical treatments, herb remedies, acupuncture and cautery remedies, and chiropractics, etc. which are folk remedies have been popular. Magnetic remedies which can be taken daily and easily to help physical conditions improve is also used by many as a promising means to overcome modern diseases for themselves.

[0008] For utilizing the functions of magnetic field lines of magnets, a magnetic treatment apparatus was officially registered as a treatment apparatus by the Pharmaceutical Affairs Law of 1961. When the human body is magnetically affected, ionization into positive and negative ions in blood is affected by force of "Fleming's Left-Hand Rule" induced by a magnetic field. Such a force activates flows of those ions in blood. As a result, blood flow containing those ions is also activated to help improve various conditions attributed to failures in blood flow such as stiff necks, dizziness, lower back problems, autonomic ataxia and the like, and this mechanism has been officially authorized. Subsequently, the magnetic treatment apparatus have been widely distributed and accepted as a completely harmless treatment apparatus utilizing natural energy, especially as a magnetic band, magnetic necklace and the like.

[0009] With such a trend, over 10 years ago when high power magnets, or "rare earth magnets", which have high power magnetic energy, such as "samarium cobalt magnet" of which magnetic energy is 2000 gauss oersted (approx. 5 folds of ferrite magnet) and "alnico magnet" which has a 30-fold-power of casting magnets were developed, it became possible to downsize the magnetic treatment apparatus. Thus, a magnetic patch chip at one point which can carry out treatment in a smart manner (trade names are Pippu Erekiban, etc.) and magnetic necklaces excellent in design have appeared and have given rise to a boom in magnetic treatment apparatuses. At present, the trend has continued to expand.

[0010] There have been attempts to improve or overcome physical ailments of modern people such as stiff necks, dizziness, lower back problems, autonomic ataxia and the like by exploiting functions and energy present in the natural world, besides the above-mentioned magnetic force of magnets. In such attempts, a proposal exists to improve physical conditions by continuously drinking natural water ionized through various means, alkali water, and an attempt also exists to supply calcium ingredients to the body for alkal-

izing the constitution by ingesting the calcium ingredients which are purified by separating pure natural calcium ingredients from Ca compounds present in the natural world such as in shells and corals, and recently, tourmaline has been recognized as a new natural material to achieve such aims, and that in a partially practical phase has been reported.

[0011] Tourmaline belongs to hexagonal rhombohedron hemihedral crystalloid, and most are composed of columnar crystals. It is an ore of which the column surface has remarkable vertical lines. Its hardness is 7 to 7.5 and specific gravity is 3 to 3.3. Its composition is represented as XY9B9Si6O27 (X is substituted with Ca, Na, K or Mn, and Y is substituted with Mg, Fe, Cr, Mn, Ti or Li). If containing much iron it exhibits a black color, and if containing less or no iron it exhibits white, blue, green, red, rouge, brown or colorless depending on its components. Among them, the most expensive called Brazil ruby is rouge in color, and one called water melon exhibits green at its crystal periphery and pink inside. These have been prized as jewels and known as noble tourmalines.

[0012] However, after piezoelectricity was found by Pierre Currie in 1880, tourmaline has been recognized as a specific mineral matter. Its several specific functions such as emitting negative ions and far infrared rays have been known. Recently, the functions of the tourmaline other than piezoelectricity have been just recognized, and studies on their practical applications are about to begin. An attempt has been proposed in which cells are activated by absorbing negative ions from pressure points of the body to induce in vivo electric current using the negative ion emitting function of tourmaline. Other trials have been reported in which, using the far infrared radiation function of tourmaline, capillary blood vessels are dilated by far infrared rays emitted in receiving heat of body temperature to facilitate peripheral blood flow in order to assist metabolism, improvement of physical conditions and fatigue recovery.

[0013] The present inventor whose occupation is total body treatment practice has noticed natural energy in the natural world and has had a great interest in the above-mentioned tourmnaline in conjunction with actively exploiting various natural sources. The inventor has not only collected and researched data already reported on various properties of tourmaline but also studied further and analyzed them for a long time. While the magnet has been granted a status as an authorized treatment apparatus and solely been used anticipating just a facilitative effect on blood circulation by dynamic action of "Fleming's Left Hand Rule" upon blood in the magnetic field of magnetic field lines, the inventor has found the fact that a specific phenomenon which had never been observed is induced on the functional properties of tourmaline such as semipermanent emission of negative ions, far infrared rays and faint light static flows in response to light, temperature, pressure and friction by combining tourmaline with the magnet, and, based on it, has performed numerous trials and attempts of experiment. As a result, the inventor has succeeded in producing extremely novel composites which combine tourmaline with the magnet and in completing and establishing processes for the production thereof. The formation is described in detail below.

DISCLOSURE OF THE INVENTION

[0014] A composite of the invention basically consists of the following formation.

[0015] That is, the composite is integrated so that tourmaline powder is combined with a magnetic material in a laminated or racemic structure.

[0016] If the formation of the composite having this basic formation is represented in other words, it can be said that the composite has a formation wherein the tourmaline powder is combined with the magnetic material in a laminated or racemic structure to be integrated, and far infrared rays of the tourmaline are elicited by an electromagnetic induction, whereby a temperature elevation of approx. 1-C. above the natural temperature is realized.

[0017] The composites having the above-mentioned basic formation include composites having the following formations.

[0018] An composite is obtained by integrating the tourmaline powder as a coating layer with the surface of the magnetic material and forming a molded body having a laminated structure composed of tourmaline and the magnetic body, and the composite is obtained by mixing and stirring the tourmaline powder with the magnetic powder, solidifying or freezing by an appropriate means to form a molded body having a racemic structure composed of tourmaline and the magnetic body.

[0019] Likewise, there includes any composites wherein the tourmaline powder, together with a clay body, are mixed and stirred with the magnetic powder to mold into an appropriate shape, which is solidified or frozen by sintering or naturally drying to form a molded body having a racemic structure composed of tourmaline and the magnetic body having a desired shape, and, as composites of this formation, there includes any composites wherein the tourmaline powder, together with the clay body and a silica sol solution, are mixed and stirred with magnetic powder to mold into an appropriate shape, which is frozen by naturally drying to form a molded body having a racemic structure composed of tourmaline and the magnetic body, and any composite wherein the tourmaline powder, together with the clay body and the silica sol solution, are mixed and stirred with the magnetic powder to mold into an appropriate shape, which is frozen by naturally drying and subsequently is solidified by sintering to form a molded body having a racemic structure composed of tourmaline and the magnetic body.

[0020] Tourmalines for the tourmaline powder are produced mainly in Brazil (approx. 90% of total production), and also in India, China, Africa, and other countries including Japan. Black or brown tourmalines are produced relatively in abundance, obtained easily, and employed advantageously in powder form of particle size 1 to 200 m or less, preferably approx. 1 to 50 m by an appropriate means such as a vibrating mill and so on.

[0021] On the other hand, the magnetic body or magnetic powder to combine with the above-mentioned tourmaline is not especially limited and, depending on purposes and usage, Cr magnets, Mg magnets, high power samarium cobalt magnets, alnico magnets and the like, besides the most popular ferrite magnets, can be appropriately employed. As the structure to combine with the above-

mentioned tourmaline, the magnetic material is flat or lump, and the surface of that is coated or statically painted with the tourmaline powder, or done so by another means, to integrate for forming the laminated structure. Or, the magnets are made into powder having similar particle size to those of tourmaline, and then both are stirred and mixed together thoroughly to take on a racemic structure, molded into an appropriate shape with various adhesives known in the art, and solidified or frozen.

[0022] When the magnetic body which has already been magnetized and provided with a given magnetic force is directly combined with tourmaline, a magnetic force exceeding 3000 gauss, as a rough standard, may lead to disturbing the laminate or mixture of both. Specifically, the tourmaline powder is prone to be repelled, and thus it is necessary that the unmagnetized magnetic body is handled to be intact, and the unmagnetized magnetic body in the laminated or racemic structure, after being appropriately solidified or frozen, needs to be magnetized by a means of magnetizing the whole. In particular, this is effective in the case of obtaining a composite having a racemic structure.

[0023] The clay can be added as a binder in the case of a composite having a racemic structure composed of the tourmaline powder and magnetic powder. Moreover, when a special functional solidification is prepared for the purpose of providing a catalyst function or far infrared effects, a zeolite or silica sol (SiO_2) solution can be added thereto and dried at room temperature to make a solidification. For the silica sol (SiO_2) solution, an ultra fine particle solution with, approx. 10 angstrom is desirable as it also holds absorptive properties, ion exchanging ability and bactericidal properties.

[0024] It is possible to make the above-mentioned frozen composite a sintered body by sintering. When sintering, zeolite is in a melting state at 850-C. However, in the case of silica sol, in order to retain its functionality, normal temperatures to 300-C. must be kept for the non-crystal, 300 to 550-C. in a sub-stable phase and 550-C. or more in a stable phase. Accordingly, the sintering body must be formed at around a glass transfer temperature Tg 420-C. so as to assure functionality while avoiding damage to end parts of the crystal. In the case of 550-C. or more, parts of silica sol assemble to the surface and a cementite crystal body is readily formed. At that time, if natural drying during mixing is carried out thoroughly, the stable composite can be readily achieved.

[0025] Relevant Invention 1

[0026] In relation to the composite of the invention having the above-mentioned formation, the invention also includes a process for producing the composite having the following novel formations.

[0027] That is, a process for the production of the composite producing the molded body having a racemic structure composed of the tourmaline powder and magnetic powder by homogenously mixing and stirring the tourmaline powder with the unmagnetized powder and solidifying or freezing by an appropriate means to form a molded body, followed by magnetizing the unmagnetized powder.

[0028] Relevant Invention 2

[0029] Further, there also includes a process for the production of the composite, wherein a composite material layer having a racemic structure composed of the tourmaline powder and magnetic powder appropriately on the surface of the base substance is formed, by homogenously mixing and stirring the tourmaline powder, together with an appropriate adhesive, with the unmagnetized powder to form a coating liquid having a racemic structure, which is coated on the desired surface of the base substance, then drying and solidifying to make a coating layer having a racemic structure on the base substance surface, and subsequently magnetizing the unmagnetized powder in the coating layer.

[0030] Relevant Invention 3

[0031] And, there also includes a process for the production of the composite, wherein a liquid composite material having a racemic structure composed of the tourmaline powder and magnetic powder is produced, by homogenously mixing and stirring the tourmaline powder, together with an appropriate adhesive, with the unmagnetized powder to form a coating solution having a racemic structure and subsequently magnetizing the unmagnetized powder at 3000 gauss or less in the coating layer.

[0032] In any of the above-mentioned processes for the production, the composite having a final homogenous combination structure can be assuredly produced using the tourmaline powder regardless of magnetic force of the magnetic powder in producing a composite having a racemic structure. In particular, in the case of obtaining a composite having a combination structure with the magnetic body having a magnetic force of 3000 gauss or more, it is extremely important that the unmagnetized powder is used and that a step to magnetize the unmagnetized powder is taken in the final stage.

[0033] Relevant Invention 4

[0034] Moreover, for the invention, the composite materials are included as materials indispensable for the above-mentioned composites and the process for the production thereof. One of the composite materials is in a coating liquid form composed of the tourmaline powder and unmagnetized powder, wherein the tourmaline powder is mixed and stirred, together with an appropriate adhesive, with the unmagnetized powder to form the coating liquid having a racemic structure and the unmagnetized powder is finally magnetized in the coating layer.

[0035] Relevant Invention 5

[0036] And, the other composite material is a powdery composite material composed of the tourmaline powder and unmagnetized powder, wherein a racemic structure is formed only by homogenously mixing and stirring the tourmaline powder and unmagnetized powder of particle size 1 to 200 m, preferably 1 to 50 m, and the unmagnetized powder is finally magnetized.

[0037] In the case of a composite material which is a coating liquid form, it is possible to make such composite material capable of being applied to any base substances by combining with additives or coating materials as solvents of optimal types and characteristics for such base substances. In particular, it can be used as an adhesive or coating film formation on the surface or between the non-magnetic bodies such as leathers, synthetic resin plates or sheets, ceramic wares, glasses, non-magnetic metals such as aluminium etc., woods and the like. Thus, the composite layer

of the invention can be formed not only on the surfaces and inside of personal equipment and goods but also on the appropriate site of various mechanical instruments and building materials. If the composite material is magnetized in the final stage, the formation of the composite layer of the invention is possible, and even demagnetization is possible by conducting a converse manipulation.

[0038] In the case of a composite material which is, powdery, the composite material plays a role as a base material for composites of the invention and the process for the production thereof as well as the above-mentioned composite material which is a coating liquid. If it is added into the adhesive or coating material, it becomes the composite material which is in a coating liquid form. Or uses in various forms are possible such as dispersal use to the adhesive or the coating surface, in addition to plastic materials and the like. As is the case with the above-mentioned coating liquid form, the step of magnetizing is required in the final stage.

Best Mode for Carrying Out the Invention

[0039] The representative examples are illustrated below so as to further clarify the above-mentioned formations of the invention.

EXAMPLE 1

[0040] A ferrite magnet (9 g) is roughly crushed, mixed with an equivalent amount of gray tourmaline, and then crushed in a vibrating mill for 5 minutes to make fine powder of particle size 5 m or less. The fine powder is a composite material as brown powder with the color tone close to chocolate.

[0041] The composite material was measured on far infrared rays of 3 to 19 m using a radiation thermometer, "IR-TE MT1000 (Yamagata Chino)" (accuracy at the calibration point). For a comparison control, simple tourmaline powder having the same particle size was also measured under the same conditions.

[0042] The results of the 10 scannings for each areas shown in the following Table 1. It was demonstrated that the temperature of the composite material was 0.31-C. higher on average than that of the simple tourmaline.

TABLE 1

Type of sample	Integrated total	Average	Difference in temperature
Composite of tourmaline powder arid magnetic powder	245.8	24.58	
Simple tourmaline powder	242.7	24.27	0.31

*The integrated total is the total value of 10 scannings for each sample.

EXAMPLE 2

[0043] Next, a magnet of 640 gauss was placed on the composite material of the Example 1 above and magnetic induction was carried out for 2 min. Subsequently, the temperature difference was measured, comparing with the sample without magnetic induction.

[0044] The results of 7 scannings for each are as shown in Table 2. It was found that the temperature of the composite material with magnetic induction was 1.08-C. higher on average compared to that of composite material without magnetic induction. This means 1.39-C. higher on average compared to the simple tourmaline in said Example 1.

[0045] The measuring apparatus and numeric processing are the same as the case 10 with said Example 1.

TABLE 2

Type of sample	Integrated Total	Average	Difference in temperature
Composite without magnetic	179.7	25.67	
Composite with magnetic induction	172.1	24.58	1.08

*The integrated total is the total value of 7 scannings for each sample.

[0046] Industrial Applicability

[0047] An established fact that the composite of the invention having the above-mentioned formation had a very warm effective temperature was obtained as a result of monitoring 75 people who wore leather shoes of which insoles contained 1 g of the composite with magnetic induction as in Example 2. As for a composite having a laminated or racemic structure composed of tourmaline powder and magnetic powder, it is believed that the crystal structure of tourmaline which is proximally disposed causes distortion by electron orbit kinetic energy, which involves magnetism when electrons are incorporated from an atmosphere, and it results in emitting far infrared rays and leads to a slight temperature elevation as the entire composite. This phenomenon has never been reported. It is an effect which cannot be obtained from either the magnet alone or the tourmaline alone. The synergistic effect obtained from the combination thereof is immeasurable.

[0048] Furthermore, even when integrated into the composite, the tourmaline powder, the magnetic body and magnetic powder never lose their own properties. Original actions of the tourmaline are retained such as the far infrared ray effect, action to water surface tension, bactericidal action, deodorant action and the like. The magnetic body remains to possess growth facilitating action to plants, facilitating actions to enzymatic reactions, control and bactericidal action for microbes, blood flow facilitating action and the like. Additionally, the characteristics that these action effects are obtained solely or synergistically can be also gained. The composite has an advantage that it is capable of being exploited instead for various fields where those are used solely.

[0049] In the process for the production of the composite, by employing a process in which an unmagnetized body is combined with the tourmaline powder and magnetization is carried out in the final stage to produce the desired composite, especially, the combination of a high power magnetic body with the tourmaline powder can be ideally carried out. Therefore, the resultant composite covers a broad application range such as daily personal equipment and goods, special treatment instruments, cultivation instruments, measuring instruments, building materials and the like for culture of life, agriculture, industries, medicine, academic research and the like. In particular, the coating liquid form of the composite material having a combination of tourmaline powder and unmagnetized powder can be highly promising for a broad application range.

[0050] As mentioned above, the composite, the process for the production thereof and the composite material of the invention can widely achieve the desired objectives by their novel formations and are anticipated to be highly evaluated in various fields, and widely distributed and utilized.

What is claimed is:

1. A composite wherein tourmaline powder is combined and integrated with a magnetic body so that a laminated or racemic structure is formed.

2. A composite wherein tourmaline powder is combined and integrated with a magnetic body so that a laminated or racemic structure is formed so as to realize a temperature elevation of around 1-C. higher than a natural temperature by eliciting far infrared radiation by electromagnetic induction.

3. A composite wherein the tourmaline powder is integrated with the surface of the magnetic body as a coating layer and formed into a molded body of the laminated structure composed of tourmaline and the magnetic body.

4. A composite wherein the tourmaline powder is mixed and stirred with the magnetic powder, then solidified or frozen by an appropriate means and formed into molded body having a racemic structure composed of tourmaline and the magnetic body.

5. A composite wherein the tourmaline powder is mixed and stirred, together with a clay body, with the magnetic powder to mold into an appropriate shape and subsequently solidifying or freezing by sintering or naturally drying to form a molded body having a racemic structure composed of tourmaline and the magnetic body having a desired shape.

6. A composite wherein the tourmaline powder is mixed and stirred, together with the clay body and a silica sol solution, with the magnetic powder to mold into an appropriate shape and subsequently frozen by natural drying to form a molded body having a racemic structure composed of tourmaline and the magnetic body.

7. A composite wherein the tourmaline powder is mixed and stirred, together with the clay body and a silica sol solution, with the magnetic powder to mold into an appropriate shape and subsequently frozen by natural drying, then sintering and solidifying to form a molded body having a racemic structure composed of tourmaline and the magnetic body.

8. A process for the production of a composite wherein a molded body having a racemic structure composed of tourmaline powder and magnetic powder is produced by homogenously mixing and stirring the tourmaline powder with the unmagnetized powder, solidifying or freezing by an appropriate means to form the molded body and subsequently magnetizing the unmagnetized powder.

9. A process for the production of a composite wherein a composite material layer having a racemic structure composed of the tourmaline powder and magnetic powder is produced on an appropriate base substance surface by homogenously mixing and stirring the tourmaline powder, together with an appropriate adhesive, with the unmagnetized powder to form a coating liquid having a racemic structure, subsequently coating, drying and solidifying the coating liquid on the base substance surface to form a coating layer having a racemic structure on the base substance surface and then magnetizing the unmagnetized powder in the coating layer.

10. A process for the production of a composite wherein a liquid composite material having a racemic structure composed of tourmaline powder and magnetic powder is produced by homogenously mixing and stirring the tourmaline powder, together with an appropriate adhesive, with the unmagnetized powder to mold into the coating liquid having a racemic structure and subsequently magnetizing the unmagnetized powder in the coating layer at 3000 gauss or less.

11. A coating liquid form of a composite material composed of tourmaline powder and unmagnetized powder to be used for the composites according to claims 1 through 10 or the process for the production thereof, wherein the tourmaline powder, together with an appropriate adhesive, is homogenously mixed and stirred with the unmagnetized powder to form the coating liquid having a racemic structure and finally the unmagnetized powder in the coating liquid is magnetized.

12. A powdery composite material composed of tourmaline powder and unmagnetized powder to be used for the composites according to claims 1 through 11 or the process for the production thereof and the composite materials therefore, wherein a racemic structure is obtained only by homogenously mixing and stirring the tourmaline powder and unmagnetized powder of particle size 1 to 200 m, preferably 1 to 50 m and finally the unmagnetized powder is magnetized.

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(12) **United States Patent**
Itakura et al.

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(54) **SHAPED ARTICLE MADE OF FUNCTIONAL MATERIAL**

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(52) **U.S. Cl.** **252/500**; 252/508; 252/512; 252/514; 252/518.1; 252/519.5; 252/520.3; 501/127; 501/128

(58) **Field of Search** 252/500, 508, 252/512, 514, 518.1, 519.5, 520.3; 501/127, 128

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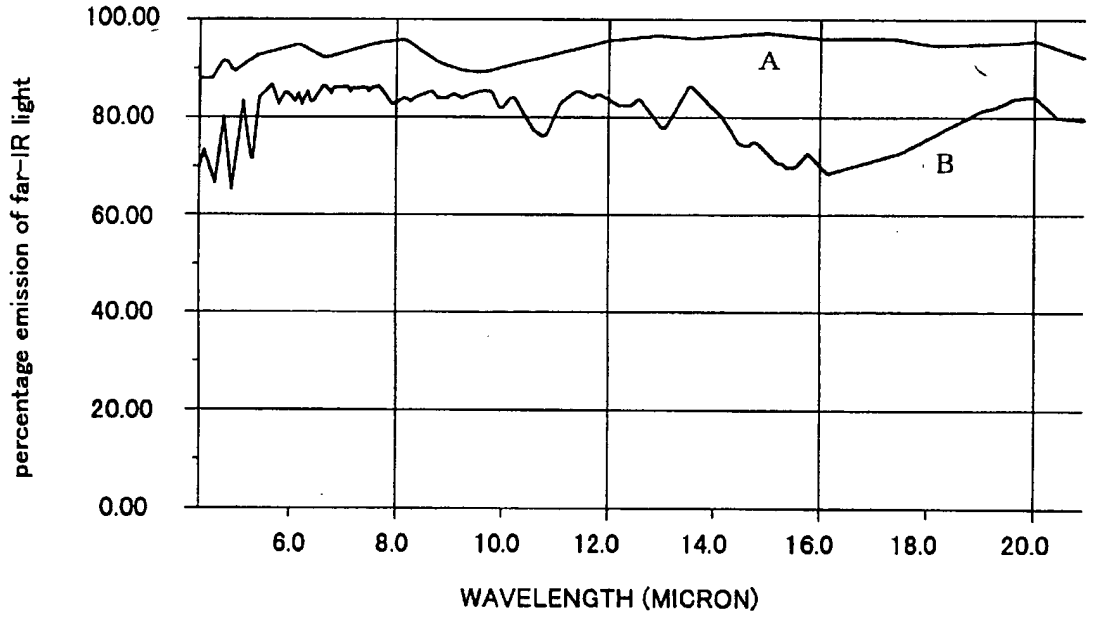
(57) **ABSTRACT**

The function of a functional material is enhanced by kneading a metallic powder, a metallic compound, or a functional mineral powder with a far-IR-radiating ceramic composition into a shape suitable for the application. A shaped article of a function-enhanced ceramic is obtained by kneading a powder of a far-IR-radiating material comprising a ceramic composition containing 52.5–70 wt % SiO_2 and 20–47 wt % Al_2O_3 in an amount of 30 wt % or more and a metallic powder, a metallic compound, or a functional mineral powder; shaping and drying the mixture; and firing.

15 Claims, 1 Drawing Sheet



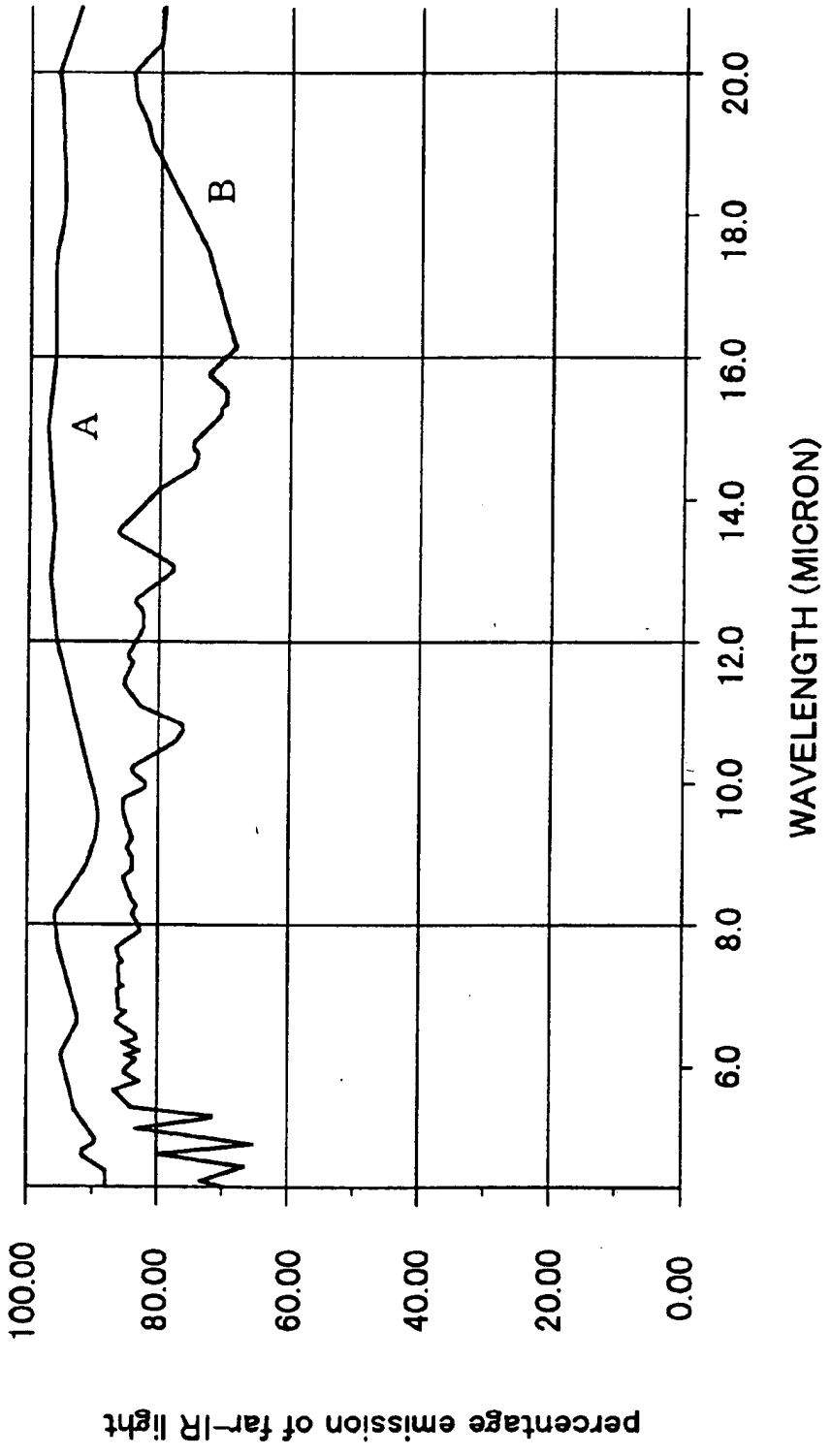

100.00
80.00
60.00
40.00
20.00
0.00
percentage emission of far-IR light
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
WAVELENGTH (MICRON)
A
B

FIG. 1

SHAPED ARTICLE MADE OF FUNCTIONAL MATERIAL

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a shaped article made of a functional material. The shaped article is produced by mixing powder of functional material such as a metallic powder, a metallic compound, or a functional mineral with a ceramic composition which radiates far-infrared light with high intensity (hereinafter simply referred to as a "far-IR-radiating ceramic composition") serving as a shaping material; and shaping and firing the mixture. More particularly, the invention relates to a shaped article made of a functional material which provides an enhanced functional effect of the functional material due to emission at room temperature of far-IR light from the ceramic composition, in order to contribute toward promoting health of the human body, purifying water, sterilizing objects by killing bacteria, and improving air quality.

2. Description of the Related Art

Conventionally, ceramic materials have been known to have a far-IR-radiating characteristic, and a variety of far-IR-radiating materials making use of such a characteristic have been produced. For example, the present inventors have developed a ceramic composition which exhibits remarkably high emission of far-IR at room temperature (Japanese Patent No. 1822582). The patented ceramic, comprising 52.5–70 wt % SiO_2 and 20–47 wt % Al_2O_3, has high mechanical strength in practice and radiates far-IR light at room temperature. There is ever-increasing demand not only for far-IR radiation, but also for radiation of negative ions, an effect of a negatively polarized electrode, an antibacterial effect, and a deodorizing effect based on adsorption. In order to meet such a demand, the following metallic powders, metallic compounds, and minerals are now on the market: quartz-schist, monazite, and tourmaline serving as negative ion-radiating materials; a piezoelectric substance, tourmaline ore, and monazite for providing negative microelectrodes; silver ion-substituted ceramics, silver microparticles, and a piezoelectric substance for obtaining antibacterial effects; and minerals having a microporous surface such as activated alumina and a piezoelectric substance for obtaining deodorizing effects based on their absorption mechanism.

However, a naturally-occurring mineral exhibiting a particular function cannot be used in the form of crushed particles, and use of a metal or a metallic compound in powder form or in the form of particles is also limited. Thus, in practice, such a mineral is preferably formed into a shape such as a ball or a plate. Since shaping of the above materials without use of an additive is difficult and in some cases such shaping is economically disadvantageous, the material are shaped by use of a binder or an extender; e.g., resin or clay.

SUMMARY OF THE INVENTION

In view of the foregoing, the present inventors have performed research and have found that a shaped article obtained from the above-described far-IR-radiating ceramic composition and a functional material powder exhibits a remarkable function that is particularly effective for improving the quality of water or a liquid organic substance, such as an oil, due to the far-IR radiation effect.

Accordingly, the present invention provides a function-enhanced shaped ceramic article, which article is obtained by mixing a powder of a functional material of at least one species selected from among a mineral, a metal, and a metallic compound, and a powder of a far-IR-radiating material-comprising a ceramic composition containing 52.5–70 wt % SiO_2 and 20–47 wt % Al_2O_3; shaping the mixture; and firing.

Preferably, the powder of a far-IR-radiating material is incorporated into the mixture in. an amount of 30 wt % or more and 90 wt % or less.

Preferably, the functional material is formed of at least one species selected from among quartz-schist, monazite, tourmaline, a piezoelectric substance, a silver ion-substituted substance, silver microparticles, a copper- or zinc-ion-substituted substance, an alumina substance, a microporous mineral, granite porphyry, quartz porphyry, Bakuhan-seki, heal stone, Iou-seki, and Kihou-seki.

Preferably, the functional material is an antibacterial substance or a substance for sterilization.

Preferably, the functional material is a ceramic powder containing silver ions, and the shaped article is used for an antibacterial purpose or for sterilization.

Preferably, the functional material is tourmaline, and the shaped article is used as a detergent aid.

BRIEF DESCRIPTION OF THE DRAWING

Other objects, features, and characteristics of the present invention will become apparent upon consideration of the following description and the appended claims with reference to the accompanying drawings, all of which form a part of the specification, and wherein reference numerals designate corresponding parts in the various figures, wherein:

FIG. 1 is a graph showing the percentage far-IR emission for cases (A) and (B), wherein case (A) is drawn to the present invention in which a far-IR-radiating ceramic composition is used and case (B) is drawn to a conventional art in which a polyester resin is used in place of the far-IR-radiating ceramic composition.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

The present invention will next be described in detail by way of examples, which should not be construed as limiting the invention thereto, in that a variety of functional materials can be employed in a wide range of amounts.

Water is a very important component among the predominant components constituting the human body, animals, and plants. When water is subjected to an electromagnetic wave having an wavelength corresponding to a resonance wavelength for vibration of the water molecule, water molecules are activated to thereby stimulate cells to exhibit enhanced antibacterial action. Far IR light is well absorbed in water or oil, inter alia, far IR light of wavelengths of 3, 6, and 8–30 μm is selectively absorbed in water, to thereby vigorously activate water molecules. However, radiation of far IR light having a wavelength of approximately 3 μm may be negligible in that the beam is not radiated from a black body at room temperature. In water, approximately 20 water molecules-associate to form a cluster. When the cluster absorbs far IR light, resonance of vibration of water molecules reduces the association degree of such a cluster, to thereby enhance mobility of water molecules. Therefore, the thus-treated water easily enters microcavities where non-treated water cannot enter, and easily removes matter adhering on a surface. Thus, far IR light provides a remarkably favorable effect on organisms via water or oil.

In recent years, there has been increased demand for functions required in everyday life, such as radiation of negative ions to air, negatively polarized water, an antibacterial effect, a deodorizing effect based on adsorption, and improvement in flavor and taste of drinking water. In order to meet such demand, specific minerals, inorganic compounds, and fine metallic powders have been made available for respective purposes. Examples of the above materials include quartz-schist, monazite, and tourmaline serving as negative ion-radiating materials; a piezoelectric substance, tourmaline, quartz-schist, and monazite to obtain negatively charged water and negative microelectrodes; silver ion-substituted zeolite, silver microparticles, copper- or zinc-ion-substituting ion-exchangers, and a piezoelectric substance exhibiting an antibacterial effect on water; alumina group minerals having a large surface area and microporous minerals such as a piezoelectric substance and monazite; and mineral-releasing stones such as granite porphyry, quartz porphyry, Bakuhan-seki, heal stone, Iou-seki, and Kihou-seki for-improved flavor and taste of drinking water. These materials are commercially available and may be used on the basis of the characteristics thereof. However, in everyday life, water is significant, and an effect of moisture is also significant in air. Therefore, when the above-described functional materials are used in the-presence of a material radiating far-IR light, functions provided by the materials are synergistically enhanced. In general, in view of stability and convenience, functional materials and minerals are preferably used in the form of balls or plates rather than in the form of crushed chips or powder. A far-IR-radiating ceramic composition containing 52.5–70 wt % SiO_2, 20–47 wt % Al_2O_3, and 3 wt % or less an Fe component as disclosed in the above-described patent has excellent formability and can advantageously be sintered within a wide range of firing temperatures; specifically, 800–1200° C. The fired composition is kneaded with a functional material or a mineral powder and water, and the mixture is shaped and fired to thereby easily produce a plate-like or a ball-like shaped article. When the ceramic composition is used in combination with a functional material such as a piezoelectric substance or tourmaline which undergoes unfavorable transformation of an effective mineral structure during firing at 900° C. or higher, the composition is selected such that the mixture can be fired lower than 900° C., expecially at 800° C.

The amount of a functional material, metal, or ion-deposited ceramic which is added to the above-described far-IR-radiating ceramic powder varies in accordance with the target function and costs. For example, silver microparticles providing an antibacterial property are added in an amount of approximately 1 wt %, whereas at least one of a piezoelectric substance, tourmaline, granite porphyry, quartz porphyry, Bakuhan-seki, heal stone, and Iou-seki is added in an amount of 50 wt %. The amount is selected in accordance with the intended synergetic effect, ease of shaping, and costs. When the amount is 30 wt % or less, the effect of addition is not attained. Thus, the above described far-IR-radiating ceramic is preferably used in an amount of 30 wt % or more. The effect of far-IR radiation is developed via water, and the content of Fe_2O_3 which possibly causes an exothermic side reaction is negligible in the above-described ceramic composition.

Plastic materials such as polyvinyl chloride and polyester are widely used as forming agents for a functional material, metal, or ion-deposited ceramic powder. However, as described below, they provide poor effect for the purposes of the present invention.

EXAMPLE 1

A powder of an antibacterial ceramic containing silver ions was prepared through ion-exchange. The powder (20 wt %) and a clay powder containing SiO_2 (56 wt %) and Al_2O_3 (38 wt %) serving as a far-IR-radiating ceramic (approximately 80 wt %) were kneaded with water, and the mixture was shaped into 5-mmϕ balls, which were-subsequently dried and fired at 850° C. or lower, to thereby produce antibacterial balls. The antibacterial property of the balls were evaluated on the basis of the results of measurement carried out by an authorized public organization. When the antibacterial balls were added in an amount of 1 wt % to bacteria-containing water, *Escherichia coli*, Staphylococcus, and Legionella populations decreased ½000–½10000 of their initial numbers after 6 hours. For comparison, the above antibacterial ceramic powder (20 wt %) was kneaded with polyester resin, the mixture was shaped into 5-mmϕ balls, and the balls for comparison were added in an amount of 1 wt % to the above bacteria-containing water. The bacteria populations did not decrease ½000–½10000 of their initial numbers until 24 hours had elapsed. The percentage emission of far-IR light in the case in which a polyester resin was used was approximately 65 wt % at a wavelength of 6 μm and approximately 80 wt % at a wavelength of 8–18 μm. The results are shown in FIG. 1.

EXAMPLE 2

The powder far-IR-radiating ceramic powder used in Example 1 (approximately 70 wt %), tourmaline powder (approximately 30 wt %), and low-melting cement powder (small amount) were kneaded with water, and the mixture was shaped into 5-mmϕ balls, which were subsequently dried and fired at 800° C., to thereby produce tourmaline balls. The tourmaline balls (200 g) were placed in a net bag, which was subsequently placed-in-an electric washing machine. A standard soiled cloth was washed by use of detergent in the machine. Ten minutes of washing sufficiently removed the soil. The effect was still confirmed even when the amount of detergent was made half the original amount. For comparison, the tourmaline powder (approximately 30 wt %) was kneaded with a polyester resin, and the mixture was injection-molded into 5-mmϕ balls. By use of the tourmaline balls (200 g), the same washing test was performed. Performance in removing soil was deteriorated by about 30 wt %, as determined by measurement of reflectivity of the cloth surface.

As described herein above, the present invention provides a shaped article of a functional material in which an effect of a functional material is synergetically enhanced by far-IR light energy at room temperature. The articles are obtained through mixing the functional material with a far-IR-radiating ceramic powder for ensuring good formability, and shaping the mixture. The articles are useful for providing a synergetic effect of a functional material such as a metallic powder, an ion-containing material, or a mineral in the presence of water or oil. The effect is provided by radiation of far IR light of wavelengths of 3, 6, and 8–30 μm, especially 8"14 μm, at which water molecules undergo resonance of vibration at ambient temperature.

While the invention has been described in connection with what are presently considered to be the most practical and preferred embodiments, it is to be understood that the invention is not to be limited to the disclosed embodiments, but on the contrary, the description is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims. The

present document claims the benefit of Japanese priority document, filed in Japan on Oct. 23, 1998, the entire contents of which is incorporated herein by reference.

Obviously, numerous modifications and variations of the present invention are possible in light of the above teachings. It is therefore to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described herein.

What is claimed is:

1. A function-enhanced shaped ceramic article, obtained by mixing

1) a powder of a functional material of at least one species selected from the group consisting of a mineral, a metal, and a metallic compound, and

2) a powder of a far-infrared-radiating material comprising a ceramic composition containing 52.5–70 wt % SiO_2 and 20–47 wt % Al_2O_3;

shaping the mixture; and

firing.

2. The function-enhanced shaped ceramic article according to claim **1**, wherein an amount of the powder of a far-infrared-radiating material is at least 30 wt % by weight.

3. The function-enhanced shaped ceramic article according to claim **1**, wherein an amount of the powder of a far-infrared-radiating material is at least 30 wt % by weight and not more than 90 wt % by weight.

4. The function-enhanced shaped ceramic article according to claim **1**, wherein the functional material comprises at least one species selected from the group consisting of quartz-schist, monazite, tourmaline, a silver-ion-exchanged substance, a silver microparticle, a copper-ion-exchanged substance, a zinc-ion-exchanged substance, γ-alumina, a microporous mineral, granite porphyry, quartz porphyry, Bakuhan-stone, Banded chert, and Kihou-stone.

5. The function-enhanced shaped ceramic article according to claim **2**, wherein the functional material comprises at least one species selected from the group consisting of quartz-schist, monazite, tourmaline, a silver-ion-exchanged substance, a silver microparticle, a copper-ion-exchanged substance, a zinc-ion-exchanged substance, γ-alumina, a microporous mineral, granite porphyry, quartz porphyry, Bakuhan-stone, Banded chert, and Kihou-stone.

6. The function-enhanced shaped ceramic article according to claim **1**, wherein the functional material is an antibacterial substance or a substance for sterilization.

7. The function-enhanced shaped ceramic article according to claim **2**, wherein the functional material is an antibacterial substance or a substance for sterilization.

8. The function-enhanced shaped ceramic article according to claim **1**, wherein the functional material is a ceramic powder containing silver ions, and the shaped article is used for an antibacterial purpose or sterilization.

9. The function-enhanced shaped ceramic article according to claim **2**, wherein the functional material is a ceramic powder containing silver ions, and the shaped article is used for an antibacterial purpose or sterilization.

10. The function-enhanced shaped ceramic article according to claim **1**, wherein the functional material is tourmaline, and the shaped article is used as an antibacterial material or a material for sterilization.

11. The function-enhanced shaped ceramic article according to claim **1**, wherein the functional material is tourmaline, and the shaped article is used as a detergent aid.

12. The function-enhanced shaped ceramic article according to claim **1**, wherein said firing occurs at a temperature of from 800 to 1200° C.

13. The function-enhanced shaped ceramic article according to claim **1**, wherein said firing occurs at a temperature below 900° C.

14. The function-enhanced shaped ceramic article according to claim **1**, wherein said functional material is a piezoelectric substance.

15. The function-enhanced shaped ceramic article according to claim **2**, wherein said functional material is a piezoelectric substance.

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US006187324B1

(12) **United States Patent**
Ogi et al.

(10) **Patent No.: US 6,187,324 B1**
(45) **Date of Patent: Feb. 13, 2001**

(54) **COSMETIC COMPOSITION COMPRISING AT LEAST ONE OF KUMAZASA EXTRACT AND MEDICINAL CARBON**

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(73) Assignee: **Kabushiki Kaisha Ogi Kogei**, Shiga (JP)

(*) Notice: Under 35 U.S.C. 154(b), the term of this patent shall be extended for 0 days.

(21) Appl. No.: **09/337,071**

(22) Filed: **Jun. 21, 1999**

Related U.S. Application Data

(63) Continuation-in-part of application No. 09/301,401, filed on Apr. 28, 1999.

(30) **Foreign Application Priority Data**

Aug. 11, 1998 (JP) 10-226712

(51) **Int. Cl.**[7] **A61K 6/00**; A01N 65/00

(52) **U.S. Cl.** **424/401**; 424/69; 424/195.1; 424/78.05

(58) **Field of Search** 424/401, 69, 195.1, 424/78.05

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(57) **ABSTRACT**

A cosmetic composition comprising at least one of Kumazasa extract and medicinal carbon. The cosmetic composition exhibits an excellent deodorizing effect and antibacterial effect, and is applied to toilet soap, facial cleansing cream, shampoo, rinse, etc.

8 Claims, No Drawings

COSMETIC COMPOSITION COMPRISING AT LEAST ONE OF KUMAZASA EXTRACT AND MEDICINAL CARBON

This is a continuation-in-part of prior application Ser. No. 09/301,401.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to cosmetic compositions for toilet soap, facial cleansing cream, shampoo, rinse, and the like.

2. Discussion of the Background

A variety of cosmetic compositions are used for toilet soap, facial cleansing cream, shampoo, rinse, etc. Recently, there have been developed cosmetic compositions that produce an antibacterial effect or a deodorizing effect.

However, those conventional cosmetic compositions include synthetic compounds, which may pose a safety problem against the human body. Some cosmetic compositions exhibit an insufficient antibacterial effect or deodorizing effect.

It is an object of the invention to provide a cosmetic composition which is capable of exhibiting excellent antibacterial effect and deodorizing effect, while avoiding harmful effects against the human body.

To achieve the above object, there has been provided a cosmetic composition which contains at least one of Kumazasa extract and charcoal. Kumazasa is a plant of the species Sasa albo-marginata. Kumazasa extract is extracted from leaves of Kumazasa by using an ethanol solution, or prepared by other conventional methods. The charcoal is preferably activated charcoal, which is called medicinal carbon in the Pharmacopoeia Japonica. It is known that Kumazasa mainly contains polysaccharides, chlorophyll, vitamin B_1, vitamin B_2, organic acids, β-amyrin, minerals, amino acids, etc.

Kumazasa extract exhibits an excellent bactericidal effect and antiinflammatory effect. It is presumable that the bactericidal effect of Kumazasa is obtainable since chlorophyllin, which is a derivative obtained by subjecting chlorophyll of Kumazasa to alkali hydrolysis, exhibits the bactericidal properties, acting directly over some types of bacteria, particularly anaerobic bacteria. Kumazasa also exhibits an adsorption effect and a deodorization effect.

On the other hand, charcoal is a porous material, and therefore exhibits the adsorption effect, thereby exhibiting the deodorization effect.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Embodiments of the present invention will be described hereinbelow.

Embodiment 1

A Kumazasa-containing cosmetic composition applied to a facial pack will be discussed in this embodiment. The components of the Kumazasa-containing cosmetic composition are as follows:

Components	% by weight
Kumazasa extract	1.5
dipotassium glycylrhizin acid	0.1
hyaluronic acid	1.0
chlorophyll	0.5
thickener (Carboxyvinylpolymer)	1.0
Sodium Alginate	0.5
Monococonut fatty acid POE (20) sorbitan	0.1
neutralizer (TEA)	1.0
water	balance to 100%

Of the components, dipotassium glycylrhizin acid is extracted from Licorice (sweet root), and exhibits a detoxication effect, an anti-allergic effect, an anti-peptic ulcer effect, an anti-dermatitis effect, etc. Hyaluronic acid exhibits an excellent moisture retention effect and an excellent permeability, thereby giving a supple appearance to the skin. Chlorophyll exhibits the deodorization effect. Sodium Alginate is prepared by purifying an extract of sea weed.

Embodiment 2

A Kumazasa-containing cosmetic composition applied to an external skin treatment agent will be discussed in this embodiment. The components of the Kumazasa-containing cosmetic composition are as follows:

Components	% by weight
Kumazasa extract	1.0
emulsifier (S-308)	3.0
synthetic oil (C10)	3.0
Jojoba oil	1.5
emulsified dispersing agent (TL-10)	2.0
amide-amine	2.0
Behenyl	1.5
lipophilic type emulsifier (BO-308)	1.0
thickener (AM-301)	4.0
hydrolysis collagen peptide (CCP-100)	0.5
Scutellaria root extract	0.1
Rosemary extract	0.1
Aloe Vera extract	0.5
chlorophyll	1.0
water	balance to 100%

Of the components, Jojoba oil is oil extracted from a seed of a shrub of the type that grows in the northern part of Mexico. It has been recognized that Jojoba oil is effective for preventing pimples and dandruff. Scutellaria root extract is of a liquefied form extracted from Abiate. It has been recognized that Scutellaria root exhibits an antiinflammatory effect, an anti-allergic effect and an antibacterial effect. Rosemary extract is recognized as being effective for improving the circulation of the blood and preventing the loss of hair and dandruff. Aloe Vera extract is effective for limiting the formation of melanin in an incised wound or abrasion of the skin.

Embodiment 3

A Kumazasa-containing cosmetic composition applied to skin lotion will be discussed in this embodiment. The components of the Kumazasa-containing cosmetic composition are as follows:

Components	% by weight
Kumazasa extract	1.0
glutamate (PCA soda)	0.5
hyaluronic acid	1.0
glycerin	3.0
1:3 BG	2.0
chlorophyll	1.0
water	balance to 100%

Of the components, PCA soda is effective for giving a moisture retention force and elasticity to the skin. 1:3 BG is prepared by adding hydrogen to the product of the aldol condensation reaction of acetaldehyde.

Embodiment 4

A Kumazasa-containing cosmetic composition applied to skin cream will be discussed in this embodiment. The components of the Kumazasa containing cosmetic composition are as follows:

Components	% by weight
Kumazasa extract	1.5
nonionic surfactant active agent	1.0
lipophilic type emulsifier (MGS-DEX)	1.0
emulsifier (GO-430)	1.0
stearic acid	4.0
paraffin	1.0
beeswax	3.0
Behenyl	3.0
liquid paraffin	20.0
chlorophyll	1.0
collagen	0.5
hyaluronic acid	0.5
placenta	0.5
dipotassium glycylrhizin acid	0.1
antiseptic agent (M-P)	0.1
water	balance to 100%

Of the components, collagen is a fibrous protein that constitutes the skin, etc., of Mammalia. It has been recognized that collagen exhibits effects for retaining moisture and maintaining elasticity of the skin, and restoring a young state of the skin.

Placenta is of a liquid form extracted from bovine, porcine, or ovine placenta. It has been recognized that placenta is effective for limiting and removing liver spots, freckles, fine wrinkles and rough dry skins.

Embodiment 5

A Kumazasa-containing cosmetic composition applied to facial soap will be discussed in this embodiment. The components of the Kumazasa-containing cosmetic composition are as follows:

Components	% by weight
Kumazasa extract	1.5
glutamate (PCA soda)	0.5
Aloe Vera extract	0.5
chlorophyll	1.0
dipotassium glycylrhizin acid	0.1
1:3 BG	1.0

-continued

Components	% by weight
Pyrotel CPI-40	1.0
Amitel LGS-5	0.5
Amisoft LS-11	1.0
Soypon SC (sodium cocoyl sarcosine)	1.0
Lauryl Mono Phosphate	1.0
Lauric Acid Diethanolamide	1.0
water	balance to 100%

Of the components, Pyrotel CPI-40 and Amisoft LS-11 are respectively available from Associates of Cape Cod, Inc., Woods Hole, Mass., and Ajinomoto K.K.

Embodiment 6

A charcoal-containing cosmetic composition applied to facial soap will be discussed in this embodiment. The components of the charcoal-containing cosmetic composition are as follows:

Components	% by weight
activated charcoal	1.0
Talc	4.0
Kaolin	5.0
Bentonite	1.7
dipotassium glycylrhizin acid	0.1
Aloe Vera extract	3.0
vitamin C	0.1
hyaluronic acid	1.0
black iron oxide	3.0
emulsified dispersing agent (TL-10)	1.0
antiseptic agent (M-P)	0.2
1:3 BG	2.0
water	balance to 100%

Of the components, vitamin C is effective for limiting and removing an abnormal pigmentation of the skin.

Embodiment 7

A charcoal-containing cosmetic composition applied to shampoo will be discussed in this embodiment. The components of the charcoal-containing cosmetic composition are as follows:

Components	% by weight
activated charcoal	1.0
amino acid	3.5
amisole	1.0
Pyrotel CPI-60	2.0
Amitel LGO	0.5
emulsified dispersing agent (TL-10)	5.0
glycerin	5.0
antiseptic agent (P-P)	0.1
nonionic surfactant active agent (Twin-20)	5.0
black iron oxide	3.0
antiseptic agent (M-P)	0.1
chitin	1.0
Kumazasa extract	0.5
water	balance to 100%

Of the components, chitin is extracted from Crustacea such as crabs and lobsters, and becomes effective for retaining moisture in the skin and the hair after sticking thereto.

Embodiment 8

A charcoal-containing cosmetic composition applied to solid toilet soap will be discussed in this embodiment. The

components of the charcoal containing cosmetic composition are as follows:

Components	% by weight
activated charcoal	1.0
beef tallow	25.48
coconut oil	11.0
hardened oil	3.0
ethanol	25.0
caustic soda	19.0
white sugar	12.0
water	3.52

Other Embodiments

It is possible to include the powder of tourmaline, catechines, etc., in the cosmetic composition in each of the above embodiments. Tourmaline is generally called denki ishi in Japan. This has a crystalline structure of a hexagonal system having a hardness of 7.25 and a specific gravity of 3.05. Tourmaline is a polar crystal and therefore displays the property that electric polarization will occur even in the case that tourmaline is not placed in an electric field, unlike common derivatives. The composition of tourmaline is represented by the formula:

$$NaX_3Al_6(BO_3)_3Si_6O_{18}(OH)_4$$

in which X represents a metallic atom optionally selected from the group consisting Mg, Fe, Mn, Li and Al. Tourmaline is called Dravite (magnesia tourmaline) in the case that X represents Mg, schorl (iron tourmaline) in the case that X represents Fe or Mn, and Elbite (lithia tourmaline) in the case that X represents Li or Al. These various forms of tourmaline produce an excellent deodorizing effect via the adsorption effect caused by its electrostatic force.

On the other hand, catechines are contained in green tea, and exhibit an antioxidation effect.

In accordance with the present invention, the amount of Kumazasa extract in the cosmetic composition is preferably in the range of 0.1 to 10.0% by weight, more preferably 0.2 to 5.0% by weight, and most preferably 0.4 to 2.0% by weight. Further the suitable amount of charcoal in the cosmetic composition is preferably in the range of 0.05 to 2.0% by weight, more preferably 0.2 to 1.5% by weight and most preferably 0.5 to 1.0% by weight.

In the embodiments, the charcoal in the compositions is activated charcoal. However, it is also possible to use charcoals other than activated charcoal, such as charcoal of bamboo, Bincho charcoal (Japanese traditional charcoal, meaning a white coal of an ilex or a broadleaf tree), or charcoal of Hinoki (Japanese cypress).

When the cosmetic composition of the present invention contains Kumazasa extract, it exhibits an excellent antibacterial effect, as well as an excellent antiinflammatory effect via the bactericidal activity of Kumazasa.

Via the adsorption effects produced by Kumazasa or charcoal, it is possible to produce the deodorizing action.

In addition, since both Kumazasa and charcoal do not inherently produce a harmful effect against the human body, they are advantageous in view of the safety requirements for the human body as compared with the conventional cosmetic compositions including synthetic compounds.

When the cosmetic composition applied on the skin has been washed away, charcoal produces such an effect as to adsorb impurities in water.

Further, when cosmetic compositions according to the present invention contain both Kumazasa extract and charcoal, the components of the Kumazasa extract are adsorbed into the porous charcoal, so that the Kumazasa extract can produce the bactericidal activity for a prolonged period of time

This specification is by no means intended to restrict the present invention to the preferred embodiments set forth therein. Various modifications to the cosmetic composition of the present invention, as described herein, may be made by those skilled in the art without departing from the spirit and scope of the present invention as defined in the appended claims.

What is claimed is:

1. A cosmetic composition comprising both Kumazasa extract and charcoal.

2. A cosmetic composition as set forth in claim **1**, wherein said charcoal is activated charcoal.

3. A cosmetic composition as set forth in claim **1**, wherein the amount of Kumazasa extract in the cosmetic composition is in the range of 0.1 to 10.0% by weight.

4. A cosmetic composition as set forth in claim **1**, wherein the amount of Kumazasa extract in the cosmetic composition is in the range of 0.2 to 5.0% by weight.

5. The cosmetic composition as set forth in claim **1**, wherein the amount of Kumazasa extract in the cosmetic composition is in the range of 0.4 to 2.0% by weight.

6. A cosmetic composition as set forth in claim **1**, wherein the amount of charcoal in the cosmetic composition is in the range of 0.05 to 2.0% by weight.

7. A cosmetic composition as set forth in claim **1**, wherein the amount of charcoal in the cosmetic composition is in the range of 0.2 to 1.5% by weight.

8. A cosmetic composition as set forth in claim **1**, wherein the amount of charcoal in the cosmetic composition is in the range of 0.5 to 1.0% by weight.

* * * * *

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(54) **HAIR COLOR APPLICATION USING CLUSTER-MODIFIED WATER**

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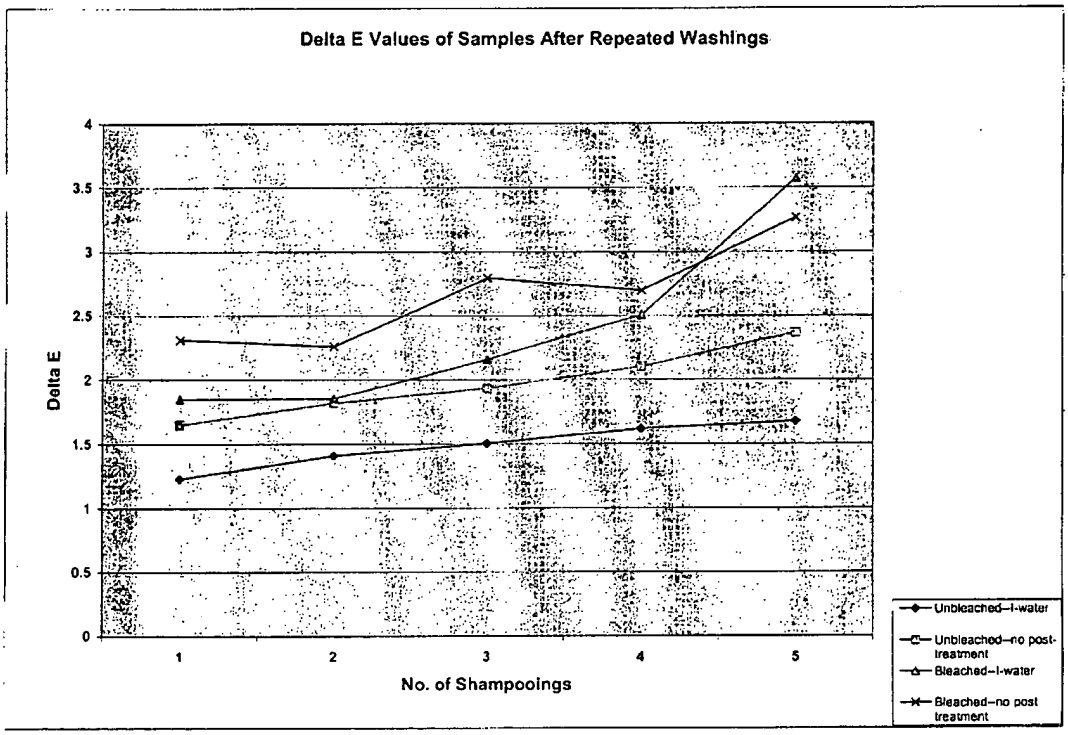
(57) **ABSTRACT**

The invention relates to methods of coloring the hair with cluster-modified water and the ability to achieve enhanced color and conditioning for the hair that is color-treated. The cluster-modified water can be ionized water such as alkalinic or acidic water, or structured water such as I or S water. In addition, the cluster-modified water can be applied to the hair as a pre-saturating treatment and/or a post-saturating treatment relative to the hair color treatment process. Additional benefits of the present invention are the ability to minimize the use of harsh chemicals and dyes while still achieving an enriched color, and increased softness and smoothness to the color-treated hair. The present invention can also be used with mordanting salts. The present invention also includes a hair coloring kit including the cluster-modified water for post-saturating and/or pre-saturating the hair.



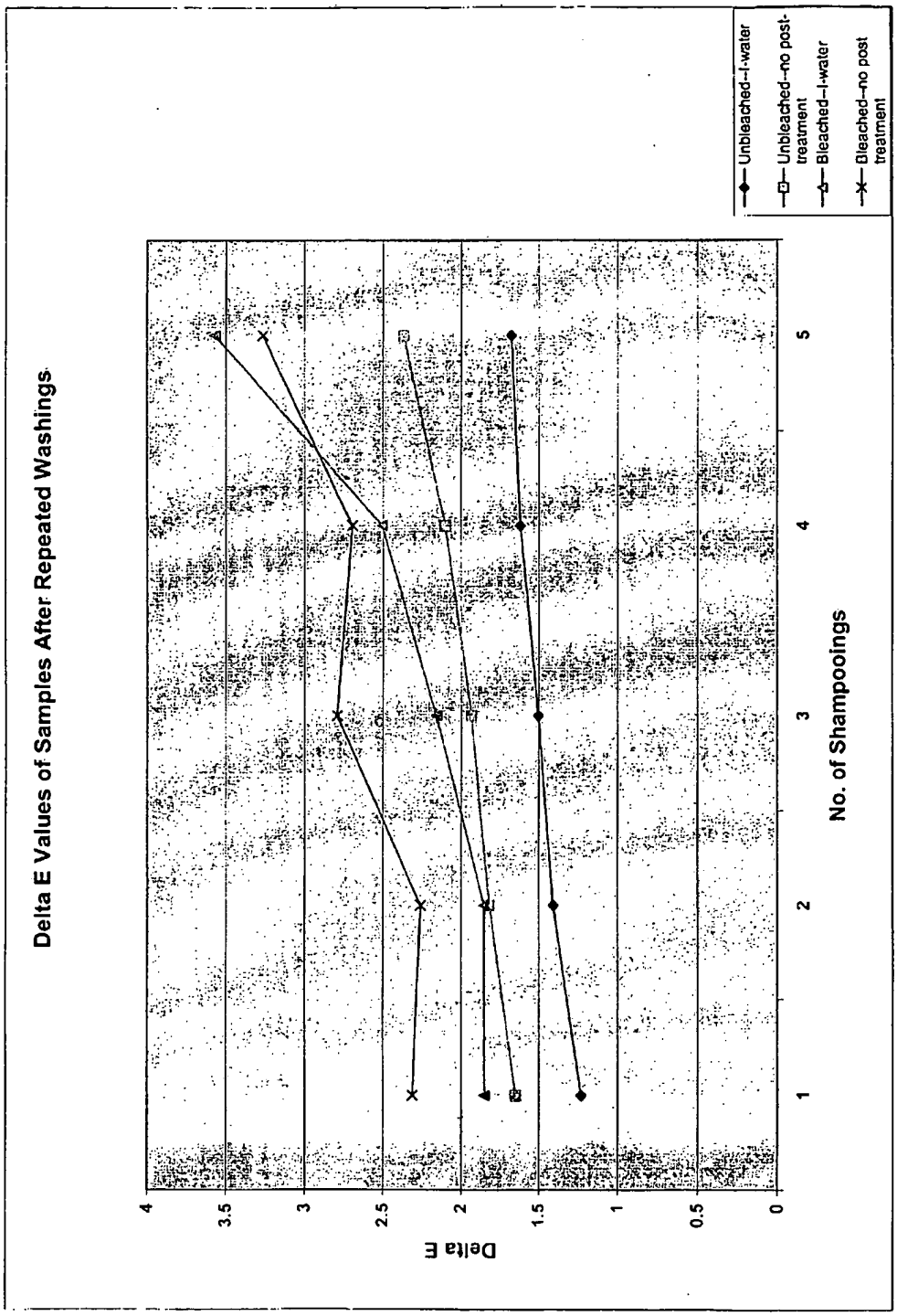

Delta E Values of Samples After Repeated Washings
Delta E
No. of Shampooings
Unbleached--I-water
Unbleached--no post-treatment
Bleached--I-water
Bleached--no post treatment
0
0.5
1
1.5
2
2.5
3
3.5
4
1
2
3
4
5

Figure 1

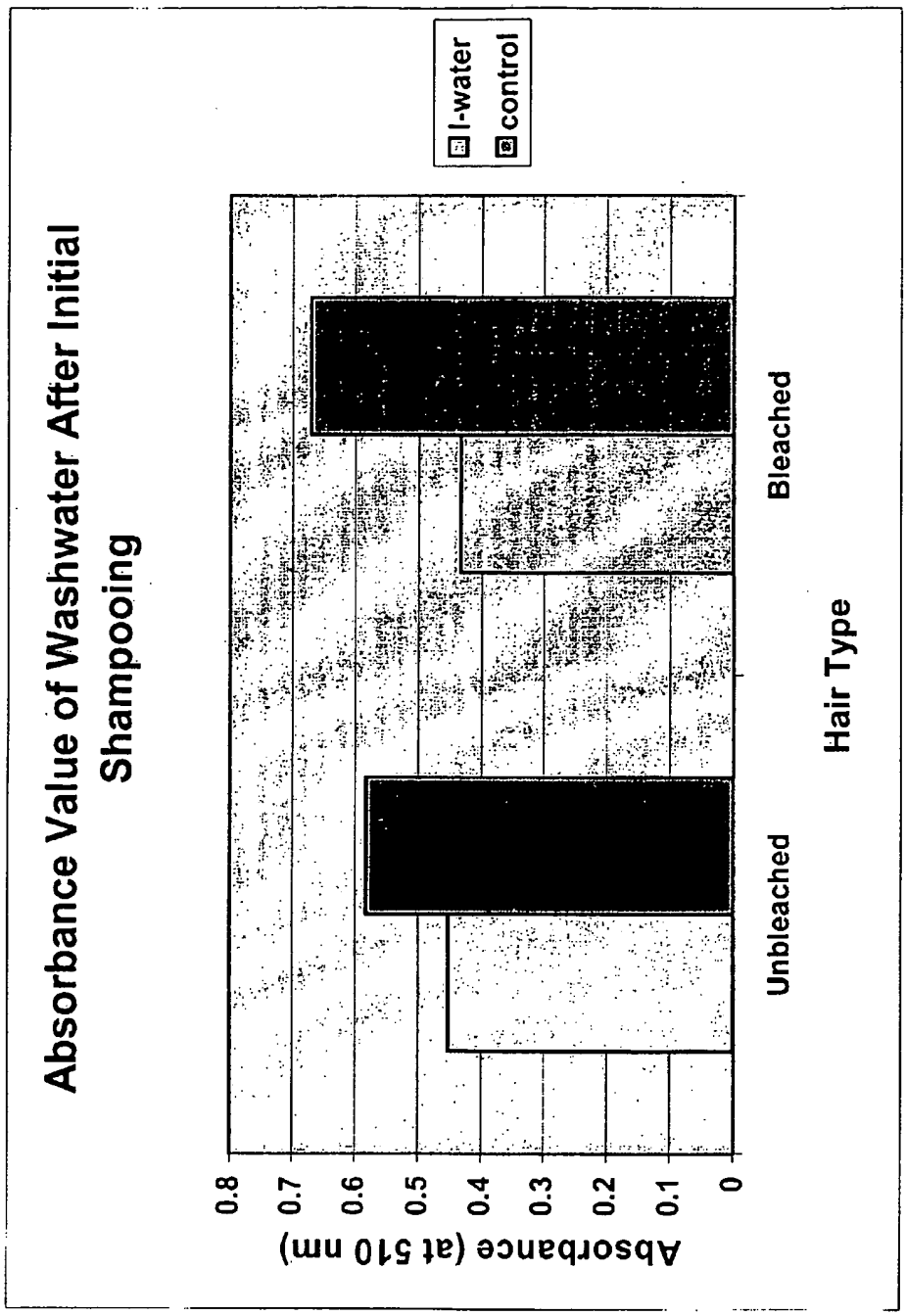

Absorbance Value of Washwater After Initial Shampooing
l-water
control
Absorbance (at 510 nm)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Bleached
Unbleached
Hair Type

Figure 2

HAIR COLOR APPLICATION USING CLUSTER-MODIFIED WATER

FIELD OF THE INVENTION

[0001] The present invention relates to structured water and hair coloring systems for permanent, demi-permanent and semi-permanent hair color. In particular, the invention relates to the cluster-modified water and the ability to enhance color that is produced by dyeing the hair when clustered-modified water is included as part of the hair coloring application, and to condition the color-treated hair.

BACKGROUND OF THE INVENTION

[0002] The coloring of hair regardless of the reason is a process that must be applied correctly. In most cases, this means that the hair color is sharp and full from the first day of coloring. In addition, the consumer needs the hair color to last, at an absolute minimum of two weeks (i.e., colorfast). Thus, a dye must be colorfast to the everyday environmental exposure of hair, most notably shampooing, styling and sunlight. Colorfastness of a dye can vary widely.

[0003] Therefore, dyes used in the coloring of hair are categorized as permanent, demi-permanent and semi-permanent. One of the most well known, and widely used coloring applications is the oxidative dyeing process. In this process, the dye is placed on the hair, and allowed to penetrate the hair and become oxidized, most typically with hydrogen peroxide to produce the desired color in the hair. The dye composition is comprised of two main components: primary and coupler. Both components are low molecular weight, which enables them to penetrate the hair and be polymerized in the presence of a base and hydrogen peroxide, to form a final, larger molecular weight dye. The chemical polymerization process in the presence of the base and the peroxide is a coupling or a condensation reaction. The base is an alkaline material that can be, for example, ammonium hydroxide, sodium hydroxide, potassium hydroxide, and calcium hydroxide. It is well established that use of these materials can to some extent be damaging to the hair.

[0004] In addition to dyes which provide permanent hair color, there are non-oxidative colorants which intentionally provide hair color that is more temporary. The fastness properties of these dyes are determined by ionic linkages, hydrogen bonding and van der Waals forces.

[0005] These dyes are mostly used in the textile industry, where application procedures normally include the use of harsh chemicals and high temperatures. When used as hair dyes, however, the application of these dyes must be applied at much lower temperatures, and generally more mild conditions. Because of these compromises in application procedures, only a temporary coloring effect will be produced. Therefore, the color is expected to last only for several shampooing cycles. These types of dyes can be used either by themselves, or in conjunction with oxidative dyes to enhance vibrancy. To achieve good durability and/or permanent effect of hair coloring, harsh chemicals and conditions are necessary.

[0006] Thus, there is a need to produce a hair color application that provides vibrant and healthy long-lasting color with minimal use of a harsh environment. It has now surprisingly been discovered that cluster-modified water is capable of increasing the depth, intensity and durability of hair color, without the use of harsh chemicals. Cluster-modified water is anomalous to the specific chemical structure of commonly known regular water in that it contains three atoms, including two hydrogen and one oxygen, in a symmetrical triangular shape. However, while the chemical structure may be simple, the water molecule as a whole is very complicated. Due to its chemical structure, water molecules exhibit partially positive and negative sites forming a dipole moment. These sites are the hydrogen atoms which form the positive sites, and the oxygen atom which forms the negative site (due to the two lone pairs of electrons associated with oxygen). As a result of the dipole moment formed by the positive and negative sites, the water molecule is capable of a phenomenon known as hydrogen bonding. Thus, water molecules have a tendency towards forming hydrogen bonds between each other and this causes the water molecules to aggregate in various sizes. Depending on the treatment applied to water different types of cluster-modified waters can be produced. Examples of treated water, whereby ionic clusters contained within water are manipulated, are found in U.S. Pat. Nos. 6,139,855 and 5,711,950 describing I and S structured water.

[0007] The use of cluster-modified water in the process of coloring hair has been surprisingly found to give color-treated hair a higher intensity of color than with the same given amount of colorant on hair color-treated without cluster-modified water. In addition, the resulting color is more durable, and has a conditioned feel and lustrous look. These benefits are achieved with any type of cluster-modified water including electrically activated, magnetically clustered and any other structured water as a treatment in conjunction with any kind of hair color procedure. Previously, it has only been known to achieve these benefits with the use of harsh chemicals typically used in hair coloring and other industries such as oxidizers, reducing agents, alkalinic and acidic ingredients, aromatic carriers and elevated temperatures and pressures.

[0008] Clustered-water application can provide the same improvements to the final color, without the additional use of the above-listed materials and/or environments.

SUMMARY OF THE INVENTION

[0009] The present invention relates to a system of hair coloring which enhances color intensity and conditions the color-treated hair with a simple application of cluster-modified water to the keratinous fiber. Most of the known procedures for increasing the depth and intensity of color, require opening the cuticle, and/or electro-chemical or chemical modification of the hair cuticle with the assistance of harsh chemicals. The present invention achieves these benefits based on the physical properties of less-aggregated water molecules, thus enabling the above-listed benefits to be obtained with decreased amounts of dye and harsh chemicals. Consequently, the system of the present invention is safer for the consumer to use, friendlier to the environment, and more economical to use. The hair coloring system comprises containers of at least one cluster-modified water, a hair coloring agent, and a shampoo.

[0010] Methods to increase color deposition on hair, especially gray hair has long been researched and still are only

known to be based on the use harsh chemicals. However, the present invention has surprisingly discovered that a method of using cluster-modified water such as ionized water or structured water, as a pre-treatment and/or a post-treatment to hair fibers that undergoes a dye or tint application with a hair coloring agent has been successful in accomplishing increased conditioning of the color-treated hair as well as enhanced color.

[0011] The method of the present invention includes dyeing the keratinous fibers by soaking or saturating the hair with clustered-modified water. The hair is pre-soaked with the clustered-modified water for a period of time, before drying the hair. The normal hair-color treatment is applied using a hair coloring agent on the dry hair. Following the hair coloring, the method of the present invention also includes steps for soaking the hair for a second time with the cluster-modified water for a given period of time. After the post-soaking, the hair is dried and can be styled as usual. The treatment of the hair by pre-soaking and post-soaking can be done individually or collectively as a treatment. Any cluster-modified water, for example, structured water and ionized water, can have an effect on the condition and coloration of the hair.

[0012] In addition, the present invention includes a hair coloring composition comprising cluster-modified water, at least one mordanting salt and at least one semi-permanent synthetic and/or natural dye.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] **FIG. 1** is a chart illustrating the effect of the present invention using I water on bleached and unbleached hair after repeated washings (five) in causing an effect on color change after shampooing (ΔE), and consequently, improving the color fastness of hair dye and enhancing the hair color.

[0014] **FIG. 2** is a chart depicting the absorbance value of washwater after initial shampooing on unbleached and bleached hair treated with I water and indicating an improvement in the color fastness and the enhancement of hair color.

DETAILED DESCRIPTION OF THE INVENTION

[0015] It has now been discovered that the color of color-treated hair can be intensified, and that the body and conditioning of the hair that is color-treated with a hair coloring agent can be enhanced by pre-soaking and/or post-soaking the keratinous fibers with a cluster-modified water. The cluster modification of the water can be, for example, a reduction in the size of water molecule clusters or separation of water molecules into hydroxyl and hydrogen ions, as in ionized water, or an organized structuring of ionic clusters as in structured water. As used herein cluster-modified water includes, but is not limited to, ionized water, and structured water. Thus, the scope of the present invention includes any water in which the clusters of water molecules, per se, or clusters of ions contained within the water are manipulated to modify the properties of the water. Specifically, structured water as used in the present specification refers to structured water described in, for example, U.S. Pat. Nos. 6,139,855 and 6,231,874. Structured water is made by treating feed water.

[0016] The feed water is an aqueous solution and has a C (μS/cm) of, for example, about 350 to about 550 and a pH of, for example, about 5.0 to about 7.5. The aqueous solution can be deionized water, distilled water or tap water. Specifically, the feed water solution is prepared with a cluster structure stabilizing ionic component of extremely small concentrations of cations and anions from materials such as for example, $CaCl_2$, $MgCl_2$, Na_2SO_4, KH_2PO_4, and KNO_3. The range of concentrations of ions in the ionic component can be, for example, $CaCl_2$ in an amount of about 5.00 to 10.00 mg/100 ml of the feed water, $MgCl_2$ in an amount of about 1.00 to 10.00 mg/100 ml, Na_2SO_4 in an amount of about 2.00 to 9.00 mg/100 ml, KH_2PO_4 in an amount of about 0.20 to about 2.00 mg/100 ml, and KNO_3 in an amount of about 0.90 to 9.00 mg/100 ml. For example, the ion content of the ionic component can be 11.00 mg/100 ml $CaCl_2$, 4.20 mg/100 ml $MgCl_2$, 5.00 mg/100 ml Na_2SO_4, 0.70 mg/100 ml KH_2PO_4, and 1.10 mg/100 ml KNO_3. The feed water has, for example, a pH of about 6.0 to 6.4 and a C (μS/cm) of about 470 to 520. The feed water can be optionally fed through a tourmaline filter at a flow rate of about 10 to 200 L/hour to reduce the surface tension of the feed water. A tourmaline filter suitable for lowering surface tension is described in U.S. Pat. No. 5,770,089, the contents of which are incorporated herein by reference.

[0017] After the desired feed water is prepared, it is processed in the structured water making device to make the structured water. The process of making structured water is described for example, in RO 88053 which describes a method for producing "B" or basic (S-type) water, and RO 88054 which discloses a method for making "A" or acid (I-type) water. Improvements in simultaneously making either of these types of water are further described in U.S. Pat. No. 5,846,397, the content of which is incorporated herein by reference. The structured water making device uses one or several serial structuring cells placed in a chemically inert parallelipipedic column made out of glass or plexiglass, for example. In a space for generating or producing the S water, the polarization and energy needed for binding water molecules, by hydrogen and hydroxyl bridges, in polymolecular aggregates (i.e., clusters) with radicals (R_m^+ stabilizing ions), is present as a result of the electrostatic field being about 80 to 120 V. Similarly, polymolecular aggregates (i.e., clusters) with radicals (R_k^- stabilizing ions) are simultaneously formed to make I water, in a space for producing I water. The structured water of the present invention does not require special storage conditions or special packaging to protect it from destabilizing factors. Further, the cluster structure of structured water is very stable. The potential energy of the system of cluster structures in structured water as a whole is minimized.

[0018] Structured water contains electronegative and electropositive clusters of water molecules stabilized by ions. Each of these two types of clusters, present in water, is commonly referred to as "I water" and "S water". On the one hand, I water contains electronegative clusters of water molecules stabilized by ions which can be characterized as being $R_m^+R_k^-(H^+)_n(H_2O)_l$, where k>>m, and conversely, on the other hand, S water contains electropositive clusters of water molecules stabilized by ions which can be characterized as being $R_k^-R_m^+H_n^+(OH^-)_p(H_2O)_l$, where k<<m. In each case of I water and S water, R_m^+ ions mainly include, but are not limited to, Ca^{+2}, Mg^{+2}, Na^+, K^+ cations, and R_k^- ions mainly include, but are not limited to, Cl^-, $H_2PO_4^-$,

SO_4^{-2} anions. The cluster structure of the structured water is very stable. While not wishing to be bound by any particular theory, it is believed that additional ions are introduced into the system of cluster structures by replacing the ion which stabilizes the structure with ions that have the same or similar ionic radius.

[0019] Ionized water as used herein refers specifically to water that has been processed to separate the water molecule into its ions (i.e., H^+, and OH) or processed with a water ionizer such as, for example, Ionice SDM-2000 Water Ionizer which is commercially available, to reduce the size of natural clusters of water molecules bonded by hydrogen bonding. The ionizer produces alkalinic water (e.g., pH of about 9 to 12) and acidic water (e.g., pH of about 2 to 6).

[0020] Any cluster-modified water can be used to pre-soak and/or post-soak the hair. When pre-soaking or post-soaking the hair, the cluster-modified water can be sprayed onto the hair using a spray bottle or by any other means of application to saturate the hair. The amount of cluster-modified water used to saturate the hair will vary depending on the quantity of hair being soaked. The soaked hair is allowed to set for a period of time. The setting time is about 30 seconds to about 15 minutes, preferably 1 to 10 minutes, and more preferably 2 to 8 minutes. To dry the hair, it can be blown dry with a hair dryer using low heat, medium airflow setting or towel dried. After soaking the hair a second time, the colored and post-soaked hair can be blown dry or towel dried, and styled as usual.

[0021] Thus, preferably, for example, S water is applied as a pre-soak to intensify the color of the hair. The color is slightly richer and/or warmer in tone without changing the level of color. Structured water such as I water is applied as a post-soak to improve the body and condition the hair. The improved body and condition is defined by an improved texture (i.e., softer), bounce and volume of the hair. These conditions are similar to a conditioning treatment and are long lasting, for example, for at least one or two days. Increased color intensity lasts for several washings indicating an increased colorfastness. The term colorfastness means that the color treated hair exhibits a reduction in color fading after washing.

[0022] Any dye or tint can be used with the present invention to color the hair permanently, semi-permanently, demi-permanently or temporarily. Thus, the coloring agent can be a dye that is oxidative or non-oxidative. However, in one embodiment of the present invention, a natural non-oxidative hair dye is used and the cluster-modified water is combined with a mordanting salt to further enhance the color fastness. The natural dye is a coloring compound that is found within and/or derived from naturally occurring materials such as for example, but not limited to, plants, roots, spores, and fungi. In this embodiment, the hair fiber is pre-soaked and/or post-soaked with a combination of the cluster-modified water and the mordanting salt. Many mordants are commonly known in the art and include, but are not limited to polyvalent metal ions. The mordant, present in the cluster-modified water, chelates with the dye to form a large metal-dye complex. The combination of the mordanting salt and the cluster-modified water can be applied to the hair at any time, e.g., prior or after dyeing. Before the complex is formed with the mordant, a dye can more readily diffuse into the hair fiber because it is a relatively small sized molecule. After the dye-mordant complex forms, it is much larger in size than the original dye molecule, and preferentially can remain inside the hair fiber. Surprisingly, this effect is found with the cluster-modified water of the present invention. While not wishing to be bound by any particular theory, it is believed that the formation of the dye-mordant complex is fortified by the ions that stabilize the cluster structures.

[0023] The mordants are polyvalent metal ions (having a valence of at least 2), particularly cations such as magnesium, aluminum, chromium, copper, tin, and the like.

[0024] Examples of specific mordants, include, but are not limited to, aluminum potassium sulfate, aluminum ammonium sulfate, magnesium sulfate, aluminum citrate, aluminum lactate, and aluminum acetate, or mixtures thereof. The mordanting salts are present in an amount of about 0.1 to about 15.0 percent by weight of the composition; and preferably about 5 to 15 percent; and most preferably about 10 to 15 percent.

[0025] In addition, any shampoo can be used to wash the hair. The present invention also includes methods of improving the condition of the hair, and enhancing the color of the hair that undergoes a color treatment. Further, the present invention can also be applied in a hair coloring system. The hair coloring system can be in the form of a kit that includes at least one container of cluster-modified water. In addition, the kit includes a hair coloring agent, and shampoo.

[0026] The following non-limiting examples illustrate the invention.

EXAMPLES

Example I

[0027] Enriching Hair Color with Ionized Water

[0028] A study to test the increased intensity of color on hair, involves an evaluation of three samples of hair treated as follows: One sample (1Dc) is color treated with Aveda Full Spectrum™ Permanent Hair Color (red-orange R/O 135728; 20 volume catalyst; 30 minute application time), rinsed with tap water and blown dry. Hair is moistened with tap water before applying color treatment. A second sample (3Dc) is moistened with alkalinic ionic (OH^-) water for about 5 minutes, color treated, rinsed with tap water, conditioned with acidic (H^+) ionic water, and blown dry. A third sample (5Dc) is moistened with alkalinic ionic (OH^-) water for about 5 minutes, blown dry, color treated, rinsed with tap water, and conditioned with acidic ionic (H^+) water. The 3Dc sample appears to have the darkest and most vibrant color of the three samples indicating that ionized water enriches the intensity of the color of color-treated hair.

Example II

[0029] Enhancement of Hair Color Using I-Water with Acid Dyes

[0030] This example includes evaluation of cluster-modified, and specifically of I-water as a post-treatment. This study focuses solely on acid dyes; no oxidative systems are evaluated.

[0031] All tresses are dyed using a red-orange (R/O) acid dye paste similar in hue to Example I. Dyes included in this paste are C.I. Acid Red 33 and C.I. Acid Orange 7. Paste is

brushed into hair using applicator brush, and then placed in an oven for 20 minutes at 40° C. Hair tresses are then rinsed under warm running tap water until clear. I-water is evaluated as a post-treatment to hair coloration. Experiment is conducted on both unbleached and bleached Level 5 hair (light brown color on a scale of 1 to 10 with 1 being black and 10 being light blonde). Post-treatments are applied by spraying and subsequent combing. Samples are thoroughly blow-dried using high heat. Samples are evaluated for the following properties: color change after shampooing (ΔE), and residual dye present in shampoo washwater, (absorbance measurements at 510 nm of water from tresses washed in a 5% solution of Aveda All Sensitive™ shampoo). Lower delta E values indicate less color change. Lower absorbance value indicates less residual dye in shampoo bath. **FIGS. 1 and 2**, respectively, illustrate the differences found between treatments.

[0032] In order to determine significance between treatments, paired t-tests, based on 95% confidence levels are performed on color change of hair after shampooing, over five shampoo treatments and residual dye in shampoo bath after initial shampooing. Significantly less color change (ΔE) is noted with I-water hair after initial shampooing for both bleached and unbleached hair. This difference continues to be significant after 5 shampooings for unbleached hair, indicative of superior color retention in I-water treated samples after shampooing. There is significantly less residual dye found in shampoo washwater for I-water post-treated samples after the initial shampooing, for both bleached and unbleached hair, meaning the I-water treated samples have superior washfastness than controls. The above measurements establish the benefits provided by I-water of the present invention; namely, improved washfastness and color stability (i.e., color fastness).

Example III

[0033] Enriching Color with Structured Water and Permanent Hair Color

[0034] Half-head evaluations are performed on qualified test subjects. Activated water is applied to the left half of heads before, during or after standard hair color applications and tap water is used on the right half of heads in standard hair coloring procedures. Aveda Full Spectrum™ Permanent or Deposit Only hair color is used for all subjects. The average pH level of water with anion/alkaline rich clusters was 11. The average pH level of water with cation/acid rich clusters is 3. Subjects are evaluated for color intensity, and scored on a nine-point scale. For pre-color activated alkaline water/post-color activated acidic water hair color processing, mean score analyses with Statistica using the t-test for dependent samples at the 95% confidence interval, indicates a significantly more intense color in comparison to the hair using standard tap water color processing.

What we claim is:

1. A method of dyeing keratinous fibers comprising the steps of:

a) pre-soaking the fibers with cluster-modified water, and

b) treating the fibers with a hair coloring agent.

2. The method of claim 1 further comprising the step of removing the cluster-modified water by drying the hair.

3. The method of claim 1 wherein the cluster-modified water is ionized water or structured water.

4. The method of claim 3 further comprising the step of combining the cluster-modified water with at least one mordanting salt.

5. The method of claim 3 wherein the structured water further comprises electronegative aggregates of water molecules forming I water or electropositive aggregates of water molecules forming S water.

6. The method of claim 3 wherein the ionized water further comprises alkalinic water or acidic water.

7. A method of dyeing keratinous fibers comprising the steps of:

a) treating the fibers with a hair coloring agent; and

b) post-soaking the fibers with cluster-modified water.

8. The method of claim 7 further comprising the step of combining the cluster-modified water with at least one mordanting salt.

9. A method of dyeing keratinous fibers comprising the steps of:

a) pre-soaking the fibers with cluster-modified water;

b) removing the cluster-modified water from the fibers;

c) treating the fibers with a hair coloring agent; and

d) post-soaking the fibers with cluster-modified water.

10. The method of claim 9 wherein the steps of pre-soaking and post-soaking the fibers further comprise the step of combining the cluster-modified water with at least one mordanting salt.

11. The method of enhancing the color of color-treated hair comprising the steps of claim 1.

12. The method of increasing the body and condition of dyed hair comprising the steps of claim 7.

13. The method of claim 12 wherein the cluster-modified water is structured water of electronegative aggregates of water molecules forming I water.

14. The method of claim 12 wherein the cluster-modified water is ionized water of acidic water.

15. A hair coloring system comprising containers of at least one cluster-modified water, a hair coloring agent, and a shampoo.

16. The hair coloring system of claim 15 wherein said cluster-modified water is ionized water or structured water.

17. The hair coloring system of claim 15 wherein the ionized water is acidic or alkalinic.

18. The hair coloring system of claim 15 wherein the structured water is electronegative aggregates of water molecules forming I water or electropositive aggregates of water molecules forming S water.

19. A hair coloring composition comprising cluster-modified water, at least one mordanting salt, and at least one semi-permanent synthetic and/or natural dye.

* * * * *

US005770089A

United States Patent [19]

Kubo

[11] Patent Number: 5,770,089

[45] Date of Patent: Jun. 23, 1998

[54] WATER TREATMENT METHOD USING TOURMALINE

[76] Inventor: Tetsujiro Kubo, 5-12-408, Shibuya 2-chome, Shibuya-ku, Tokyo, Japan, 150

[21] Appl. No.: 236,154

[22] Filed: May 2, 1994

Related U.S. Application Data

[63] Continuation of Ser. No. 968,142, Oct. 29, 1992, abandoned, which is a continuation-in-part of Ser. No. 874,230, Apr. 27, 1992, abandoned, which is a continuation of Ser. No. 586,973, Sep. 24, 1990, abandoned.

[30] Foreign Application Priority Data

Oct. 3, 1989 [JP] Japan 1-257130

[51] Int. Cl.[6] C02F 1/28

[52] U.S. Cl. 210/661; 210/679

[58] Field of Search 210/679, 287, 210/290, 502.1, 503, 661

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Primary Examiner—Ivars Cintins

Attorney, Agent, or Firm—Wenderoth, Lind & Ponack

[57] ABSTRACT

An apparatus and method using fine tourmaline crystals is provided which is capable of creating an interfacial purifying activity in water. The inventor is the first to discover that tourmaline crystals, when ground preferably to about 3 microns in size, possess permanent polarity unless heated to their Curie point of between 950°–1000° C. for 2–3 hours. The apparatus and method utilize a plurality of free bodies contained in a housing for passing water to be treated therethrough. The free bodies comprises a mixture of these fine tourmaline crystals which together with an electrically insulating material which electrically insulates the fine tourmaline crystals from one another. The free bodies are preferably spherical pellets about 3–5 millimeters in diameter. The water interfacial purifying activity does not only treat water by reducing or removing cholorine and ion components, but it also helps remove contaminants incrusted on the inner surfaces of water conduits and supply lines.

7 Claims, 4 Drawing Sheets

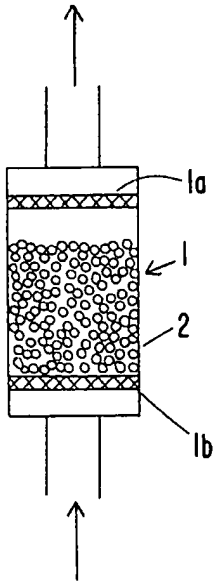


FIG. 1

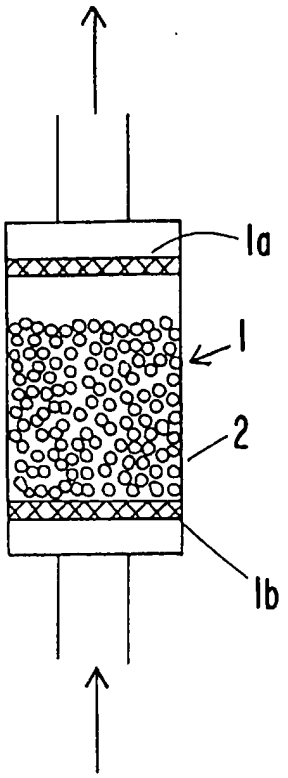


FIG. 2

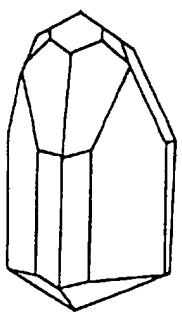


FIG. 3

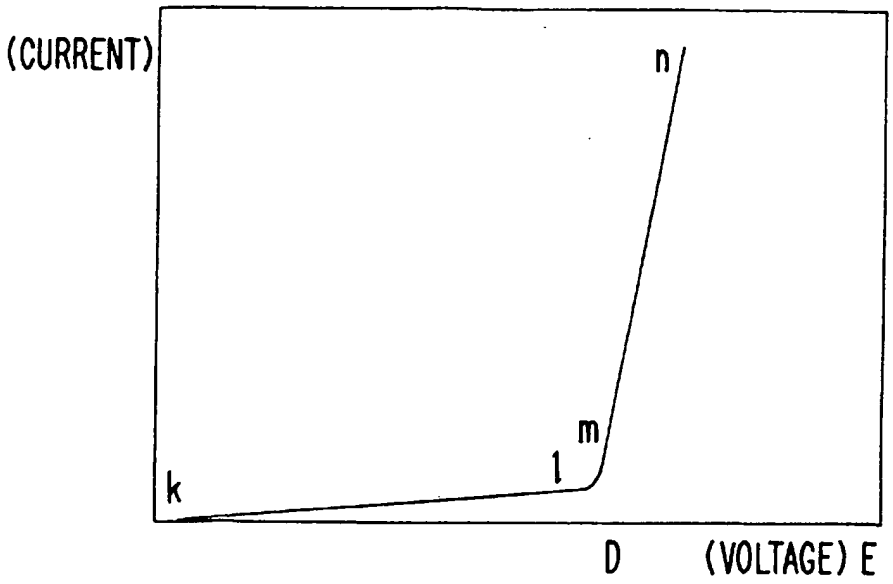


FIG. 4

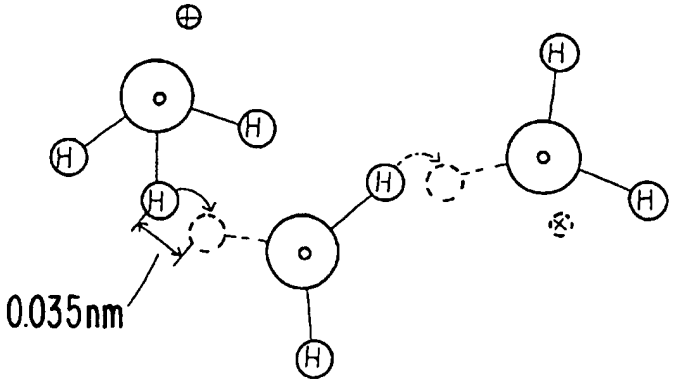


FIG. 5

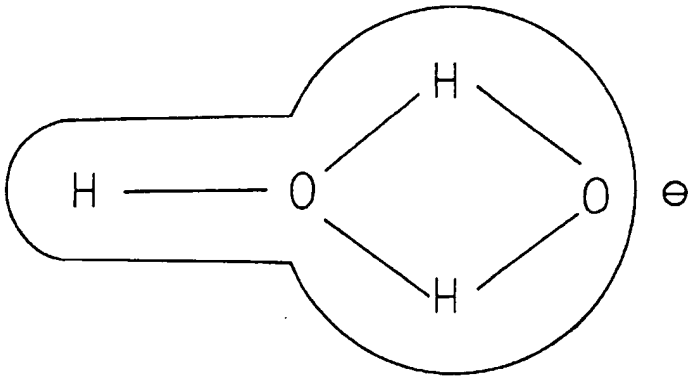


FIG. 6

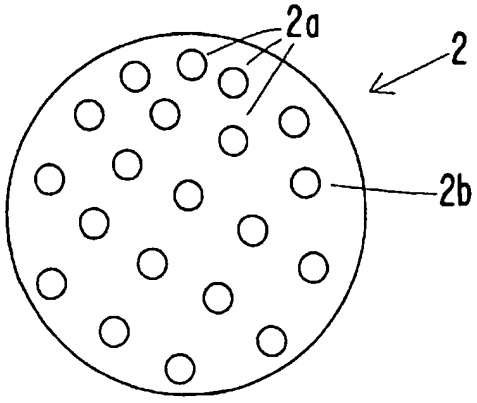
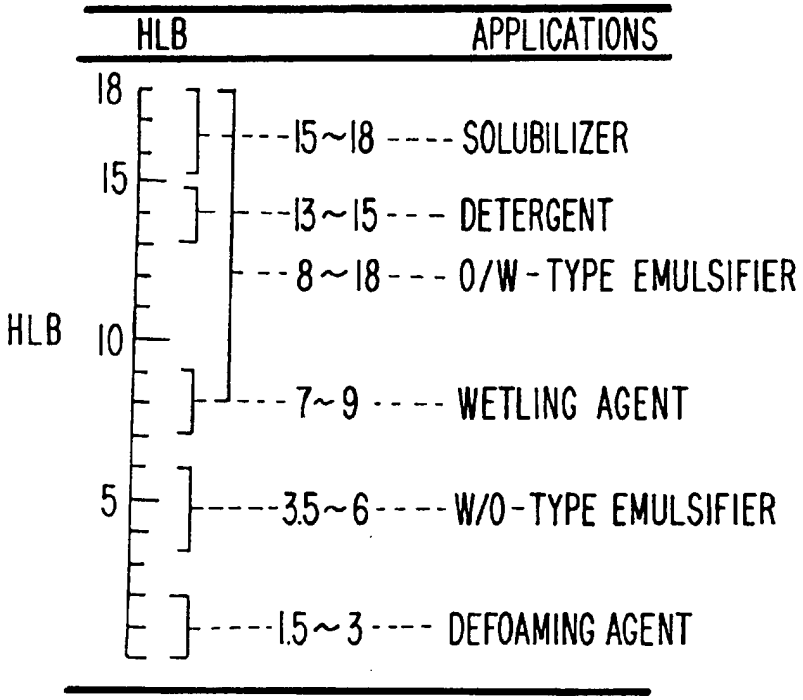


FIG. 7


HLB
APPLICATIONS
18
15
10
5
HLB
15~18 ---- SOLUBILIZER
13~15 --- DETERGENT
8~18 --- O/W-TYPE EMULSIFIER
7~9 ---- WETLING AGENT
3.5~6 ---- W/O-TYPE EMULSIFIER
1.5~3 ---- DEFOAMING AGENT

WATER TREATMENT METHOD USING TOURMALINE

This application is a continuation of now abandoned application, Ser. No. 07/968,142, filed Oct. 29, 1992, which is a Continuation-in-part of now abandoned application Ser. No. 07/874,230 filed on Apr. 27, 1992; which is a continuation of now abandoned application Ser. No. 07/586,973 filed Sep. 24, 1990.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates broadly to obtaining water having an interface activity by intensifying the interfacial purifying action inherent in water and by newly imparting to water an interface activating action which the water does not normally possess. More specifically, the invention relates to an interfacial purifying apparatus using tourmaline, a method thereof, and granules composed of tourmaline crystals as a chief component.

The present invention essentially includes seven separate but related inventions as described below.

In general, the first to sixth inventions relate to interfacial purifying apparatuses and to methods using tourmaline by repeatedly bringing a plurality of granules, also referred to as free bodies hereinbelow, composed of tourmaline crystals as a chief component into contact and collision with one another, such that matters adhered to the surfaces of the plurality of free bodies are dislodged from the surface of the free bodies.

The second and fifth inventions provide free bodies having an increased mechanical strength such as abrasion resistance using a ceramic, and the third invention relates to the method thereof.

The fourth and fifth inventions relate to interfacial purifying apparatuses utilizing the electrification phenomenon by bringing a plurality of ceramic bodies into contact and collision with one another, in addition to utilizing the permanent electrodes of the tourmaline crystals, and the sixth invention relates to the method thereof. The seventh invention relates to the tourmaline granules used for all of the aforementioned inventions. These inventions are discussed in specific detail hereinbelow.

2. Prior Art

There have heretofore been proposed methods of washing a variety of interfaces by dissolving in water chemical agents such as detergents composed chiefly of a surface activating agent. However, there has not yet been proposed a method of washing a variety of interfaces not using chemical agents but using interface-active water produced by utilizing electric energy to wash interfaces.

Systems which use the above-mentioned chemical surface activating agents are not only expensive in terms of the construction of their facilities and purchase of chemicals, but they also cause environment pollution which adversely effects rivers, lakes, ponds, seas, animals, plants, and humans. This results in the need to expand the facility to treat the wastes generated, creating a vicious circle.

The present patent applicant has previously filed a Japanese patent application relating to an invention covering an electret streaming electric field purifying apparatus and method thereof on Sep. 7, 1988 (Japanese Patent Application No. 222559/1988). The applicant has now conducted further studies and has arrived at the present invention.

What should be noted initially is that the present invention relates to "interfacial purification", not simply to a "treatment of water".

That is, the interfacial purifying unit or apparatus of the invention using tourmaline is not simply a water treatment apparatus, although it does create a change in water properties. The treatment of water has a primary meaning of purifying water by removing contaminants in water. In the case of the "interfacial purifying apparatus", the substance to be treated is not "water" per se but contaminants such as those that are incrusted and adhered to the surface of tiles, or red rust, in conduits. The water has a "self-purifying action", i.e., it cleans the surfaces of paths such as conduits and walls of a reservoir which come in contact with water, thereby to prevent water itself from being contaminated. In this case, it is not the water that is treated but it is the foul on the interface that is treated. The object of the invention is thus to purify or fix the contaminant on the interface and to prevent the water from being contaminated again.

The fluidized electric field method changes the condition of a variety of things and gives a new function or "activity" to water molecules relying upon an electrochemical method.

The specification of the invention filed previously describes that the group of substances called "electrets" includes tourmaline. However, the inventor's latest study has resulted in the discovery that tourmaline should not be included in this group of substances called electrets, since an electret is quite different in electric polarization from tourmaline.

The substances called electrets were first obtained by melting a certain kind of dielectric material followed by solidification of it between electrodes to which a DC voltage is applied. Even after the electrodes are removed, the surfaces that have been in contact with the electrodes remain electrified in a positive and negative polarity and the electret maintains the electrification for a long time. This substance is called an "electret" after the magnet. Thereafter, several kinds of electrets composed of high molecular compounds such as polyfluorovinylidene (PVDF) were developed. Among the ferromagnetic materials, magnets embody those which have relatively strong residual magnetism and coercive force. Among magnets, those having a great residual magnetism and coercive force are called "permanent magnets".

The residual magnetism of a magnet is lost when the material is heated to a certain temperature. It can be, however, magnetized again by an external magnetic field. An electret cannot sustain the electric charges at room temperature, even without heating, that is, the charge holding capacity is small. It does not therefore correspond to a magnet called a "permanent magnet" but to a magnet having a weak coercive force. The word "electric pole" in contrast to "magnetic pole" is used. The inventor of the present application has studied and experimented on the electric properties exhibited by tourmaline, and has discovered the following facts.

(1) That tourmaline is not a ferroelectric substance but is a polar crystalline material.

(2) The crystal bonds of tourmaline are mostly of ionic bonds but partly of covalent bonds. The center of the ionic molecule at a lattice point of the crystal is fixed in a position apart from its true position and is in a strained condition. The reason why the positive and negative electric poles develop at both ends of the crystal and why this distortion is fixed is that crystals of a new substance are formed in a certain environment of heat, pressure, water and gases produced by the contact of a magma (lava) with a certain kind of igneous rock (granite), and the lattice structure of the crystals is fixed by rapid cooling in a strained condition compared with the normal structure. In order to remove the strain, the size and

shape of the crystal lattice must be changed requiring large amounts of energy. Because of this, tourmaline has a property of so-called permanent electric poles which persist due to a large capacity to hold the electric polarization.

When heated to about 1000° C., the permanent electric poles vanish and do not develop any more even when an external electric field is applied thereto. There are many ferromagnetic materials that can be called permanent magnets, but it has long been said that no substance has been found among dielectric materials that can be called a permanent electret having permanent electric poles (for example see Knowing Ceramics, by Sumio Sakubana, Professor in Kyoto Univ., p. 22, published by Agnes Co.).

In view of the above literature and research, the present inventor is the first to discover that tourmaline has electric poles corresponding to the magnetic poles of a permanent magnet.

The reason why the positive and negative electric poles appearing at both ends of the tourmaline crystal are not neutralized and extinguished is probably because the crystals between the electric poles has high electric insulation, the amounts of electrons donated and accepted between the positive and negative electric poles are the same, and the electrons passing through the crystal lattices between the electric poles are mobilized by the ionic lattices and by the action of the dielectric material that includes fine crystals of tourmaline. However, the principle and mechanism thereof will be clarified by future study.

What is important for the present invention is that tourmaline exhibits electric polarization that corresponds to permanent electric poles as an electric characteristic, and this fact was discovered by the present inventor for the first time. The inventor has further discovered another important fact. That is, the fact that water can be obtained having an interface activity owing to the reaction between water and the permanent electrodes of the tourmaline crystals. This will be described below.

As for the electric properties possessed by the tourmaline, there have been known only the properties of piezoelectricity discovered by Jacques and Pierre Curie in about 1890 and pyroelectricity discovered thereafter. These properties of tourmaline pertain to an "electrification phenomena" which are quite irrelevant to the "existence of permanent electrodes". The present inventor has clarified through experiments the existence of the permanent electric poles in the tourmaline. The inventor has also clarified that the permanent electric poles can be lost at a certain temperature between 950° C. and 1000° C. These experiments are summarized below. Owing to the discovery of such facts, high molecular compounds that have heretofore been referred to as an electret should now be distinguished from tourmaline.

Insofar as the conventional term "electret" corresponds to a magnet, tourmaline should be called a permanent electret, considering that it has permanent electrodes. At present, furthermore, such characteristics have been found in tourmaline only. In this application, therefore, such material are referred to as "tourmaline" to avoid misunderstanding and confusion.

Described below is a monomolecular film formed by an interface activating substance.

A hydrophobic group of an interface activating substance and water repel each other and may exhibit two behaviors. One behavior is where the hydrophilic groups of the interface activity substances are attracted to water, while the hydrophobic groups protrude in the direction opposite to water, and the substances collect in an interface to form an oriented monomolecular film. The other behavior is where the hydrophobic groups collect together in spheres called "micelles" in the water so that the contact surfaces between the hydrophobic groups and the water may decrease. The spheres stably exist in water because the sphere's exterior surface is covered with hydrophilic groups. Hydroxyl ions ($H_3O_2^-$) act as an interface activating substance to form a monomolecular film too. The hydroxyl ions migrate via water molecules in a hopping system at a speed much faster than that of ordinary ions that migrate pushing the water molecules aside.

The monomolecular film formed in the interface of water covers the whole interface of water; namely, water is enveloped with this film. The monomolecular film has a thickness of 5 to 10 angstroms which is very thin compared with the total amount of water.

Hydroxyl ions are formed by the electrolytic dissociation of water in very small amounts and the monomolecular film is formed by the collection of this substance on the interface in very small amounts. Therefore, the concentration is sufficiently large. Hereinbelow, water is classified into "water of interface" and "whole water" for easy understanding.

Described below are the two actions of the hydroxyl ion and its effects.

Free hydroxyl ions, as a weak interface activating substance, produce water having such interface activities as emulsification, colloidization, dispersion, solubilization, wetting, permeation osmosis, etc. In addition to the above actions, there are the following actions due to the properties of the hydroxyl groups that are hydrophobic groups oriented in a direction opposite to the water.

(1) Reducing action on the interface.

(2) Neutralization (7.0 to 8.0) of ice on the interface.

(3) Chlorine is not volatilized as the hydrolysis of chlorine proceeds. No change takes place in the amount and condition of chlorine of internal water enveloped by the monomolecular film. The same also holds true for other volatile chlorine compounds.

(4) A compound, i.e., M(OH)n is formed on the surface of a metal (M) with which water is in contact and, then, the passive state of the metal is formed. Further, the neutral (or weakly alkaline) interface water of (2), together with the action (3), prevents the passive state of a metal from being destroyed and further works to maintain this state.

(5) The free hydroxyl ions react with a difficultly soluble metal compound to form a soluble salt thereof in a very small amount, and further form metal ions thereof.

SUMMARY OF THE INVENTION

In view of the aforementioned problems, the interfacial purifying apparatus using tourmaline, method thereof and tourmaline granular material according to the present invention, utilize electric energy created by the permanent electric poles of tourmaline crystals. Various matters adhered to the poles of the tourmaline crystals are dislodged by the fluidization, friction and washing conditions, so that the electrode surfaces are reexposed.

A fine powder of tourmaline crystals is enveloped with an electrically insulating material to form the free bodies, the crystals being electrically insulated so that electric charges of positive and negative poles may not be neutralized and cancelled.

According to the fourth to sixth inventions, furthermore, some known actions resulting from several dielectric phe-

nomena exhibited by a dielectric material are multiply added to the tourmaline.

Concretely described below in detail are the interfacial purifying apparatus using tourmaline, method thereof and tourmaline granular material according to the present invention.

First, described below is the constitution of the interfacial purifying apparatus using tourmaline according to the first invention. There is first provided a plurality of free bodies composed chiefly of tourmaline. The free body is one in which the fine powder of tourmaline crystals is electrically insulated and solidified with an electrically insulating material. In this specification, this is referred to as the free body of tourmaline crystals.

The solidification is not limited to a method where the mixture is kneaded with water, dried and sintered like a ceramic material. It includes those methods of solidification using natural drying, and includes many kinds depending upon the kinds and properties of the electrically insulating materials (dielectric materials) that are used.

Next, there is a container having orifices for passing water but not passing the granular material. The container contains a plurality of free bodies composed chiefly of tourmaline. There is further a fluidizing means, i.e. water, which fluidizes the free bodies.

Described below is the constitution of the interfacial purifying apparatus using tourmaline according to the second invention. According to this invention, the fine powder of tourmaline crystals is electrically insulated with a ceramic material thereby to further increase the mechanical strength such as abrasion resistance.

First, there is a plurality of free bodies obtained by mixing tourmaline and a ceramic powder for raising the mechanical strength, followed by granulation and baking. Next, there is provided a container having orifices for passing water but not for passing the granular material. The container contains the plurality of the tourmaline free bodies. There further is a fluidizing means which fluidizes the free bodies.

Described below is the constitution of the interfacial purifying method using tourmaline according to the third invention. This invention relates to a method of using the interfacial purifying apparatus that uses the tourmaline of the aforementioned first invention.

First, the plurality of free bodies composed of tourmaline are fluidized in water. That is, the free bodies come into contact and collision with each other. The matters adhered to the surface of the free bodies are then dislodged by washing, and the above-mentioned steps are repeated.

Described below is the constitution of the interfacial purifying apparatus using tourmaline according to the fourth invention. In this invention, the free bodies of the first invention are mixed with free bodies containing electrically insulating ceramic particles having a dissimilar dielectric constant. Otherwise the apparatus is the same as that of the aforementioned first invention, and the whole description of its constitution is not repeated here.

Described below is the constitution of the interfacial purifying apparatus using tourmaline according to the fifth invention. In this invention, the free bodies of the second invention are mixed with free bodies containing electrically insulating ceramic particles having a dissimilar dielectric constant. Otherwise the apparatus is the same as that of the aforementioned first invention, and the whole description of its constitution is not repeated here.

Described below is the constitution of the interfacial purifying apparatus using tourmaline according to the sixth invention. In this invention, the free bodies of the third invention are mixed with free bodies containing the electrically insulating ceramic particles having a dissimilar dielectric constant. Otherwise the apparatus is the same as that of the aforementioned third invention, and the whole description of its constitution is not repeated here.

Finally, described below is the constitution of the tourmaline granular material according to the seventh invention. According to this invention, the tourmaline is sorted out from the tourmaline country rock that contains tourmaline in amounts greater than a certain value, ground and then pulverized to obtain a fine powder of tourmaline. Next, the fine particles or crystals of tourmaline are electrically insulated from one another using an electrically insulating material (dielectric material) and then solidified.

Thé solidification method is not limited to one in which the mixture is kneaded with water, dried and sintered like a ceramic material, and includes many kinds according to the kind and property of the electrically insulating materials that are used.

Concretely described below in detail is the operation of the interfacial purifying apparatus using tourmaline, method thereof and tourmaline granular material according to the present invention.

First, described below is the operation of the interfacial purifying apparatus using tourmaline according to the first invention. The free bodies composed of tourmaline are contained in the container which has orifices for passing water but not passing the plurality of the granular material; i.e., though the water is allowed to flow out, the granular material does not flow out from the container. The fluidizing means such as an ascending stream fluidizes the plurality of free bodies.

In the free bodies, the fine particles of tourmaline are electrically insulated from each other with an electrically insulating material, and the individual electric poles of the fine particles of tourmaline function effectively.

Described below is the operation of the interfacial purifying apparatus using tourmaline according to the second invention.

The electrically insulating (dielectric) ceramic material for reinforcing the abrasion resistance increases the mechanical strength of the tourmaline granular material and electrically insulates the fine tourmaline crystals. Otherwise the operation of the apparatus is the same as that of the first invention, and the description of operation thereof is not repeated here.

Described below is the operation of the interfacial purifying method using tourmaline according to the third invention. This invention deals with the purifying method by utilizing the free bodies of the aforementioned first invention. First, the free bodies are fluidized in water. Owing to this fluidization, the individual free bodies come into contact and collision with one another. Therefore, the adhered matters are dislodged from the surface of the free bodies. Then, the adhered matters dislodged from the electrode surfaces of the tourmaline are separated by precipitation from the water, and the electric poles on the surfaces of the free bodies appear. These steps are repeated.

Described below is the operation of the interfacial purifying apparatus using tourmaline according to the fourth invention. According to this invention, the free bodies of the first invention are mixed with free bodies of ceramic particles having a dissimilar dielectric constant. Operations stemming from the dielectric phenomena possessed by the dielectric materials multiply their effect. Otherwise the

operation is the same as that of the aforementioned first invention, and the description of the operation thereof is not repeated here.

Further described below is the operation of the interfacial purifying apparatus using tourmaline according to the fifth invention. According to this invention, the free bodies of the second invention are mixed with free bodies of ceramic particles having a dissimilar dielectric constant. Therefore, the mechanical strength of the granular material composed of the tourmaline as a chief component is reinforced, and the dielectric phenomena thereof work to multiply the electric field effect produced by the tourmaline electric poles.

Other the operation is the same as that of the aforementioned second invention, and the whole description of the operation thereof is not repeated here.

The operation of the interfacial purifying method using tourmaline according to the sixth invention will now be described. In this invention, the free bodies of the third invention are mixed with free bodies of ceramic particles having a dissimilar dielectric constant. Therefore, the dielectric phenomena work is multiplied. Otherwise the operation is the same as that of the aforementioned third invention, and the whole description of operation thereof is omitted.

Finally, the operation of the tourmaline granular material according to the seventh invention will now be described.

A fine powder of tourmaline is selected from the tourmaline country rock that contains tourmaline followed by fine pulverization, the electric charges being cancelled by each other due to the attraction and contact of positive and negative electric poles thereof. Then, the fine powder is enveloped by an electrically insulating material, and is electrically insulated and is solidified. Accordingly, the electric poles appear on the individual particles of the tourmaline.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side view of an embodiment of an interfacial purifying apparatus using tourmaline according to the present invention;

FIG. **2** is a front view of a tourmaline crystal;

FIG. **3** is a diagram illustrating the electrolysis of water;

FIG. **4** is a diagram illustrating the migration mechanism of protons in an aqueous solution;

FIG. **5** is a model diagram of hydroxyl ions that work as an interface activating substance;

FIG. **6** is a side view of an embodiment of a free body containing tourmaline crystals; and

FIG. **7** is a diagram of comparison showing the relationship between the hydrophile-lipophile balance (H.L.B.) values and the applications.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The interfacial purifying apparatus using tourmaline, method thereof and tourmaline granular material according to the present invention will now be described in detail in conjunction with the accompanying drawings.

Tourmaline has some different compositions. Basically, however, it is a silicate mineral containing boron. Belonging to a trigonal or hexagonal hemimorphic hemihedry group, tourmaline exhibits a hemimorphy which is asymmytrical with respect to the horizontal plane. A typical example is expressed by the following chemical formula,

$$3[NaX_3Al_6(BO_3)_3Si_6O_{18}(OH,F)_4]$$

(X=Mg, Fe, Li, etc.)

The tourmaline exhibits a variety of colors according to the element X that is contained therein, ranging from no color, to red, yellow, green, blue, purple, brown, and black.

Tourmaline has a specific gravity of from 3.1 to 3.2, and a hardness of 7.0 to 7.5 in Mohs' scale of hardness, which is slightly harder than quartz but is a little soft as a jewel. A green and beautiful tourmaline is compatible with emerald and is highly appreciated as a jewel in Western countries. FIG. **2** is a front view of a crystal thereof.

The most important feature among the electric properties of the tourmaline is neither the piezoelectricity nor the pyroelectricity properties, but rather the possession of permanent electric poles that correspond to permanent magnetic poles of a permanent magnet. Like permanent magnets, the permanent electric poles possessed by the tourmaline will be utilized and applied in various fields.

A dielectric material develops electric polarization in an electric field. However, there exists crystals that are electrically polarized originally even when no electric field is applied from the external side. In this crystal, the center of the positive charge and the center of the negative charge of a unit lattice are deviated from the positions where they should be. Since the "deviation" is very large, the crystal structure itself must be greatly changed in order to extinguish the polarity created by the "deviation". The crystal structure cannot be changed by the application of an external electric field of an ordinary intensity. Therefore, the electric polarity does not change.

In the tourmaline crystal, the electric poles are formed at both symmetrical ends. A sharp end of the crystal becomes a positive electric pole and a relatively flat end of the opposite side becomes a negative pole. The poles are not extinguished by an external electric field at room temperature and atmospheric pressure, and are thus called permanent electric poles. In view of the fact that the permanent magnetic poles of a magnet extinguishes at a Curie point, it is considered that the permanent electric poles would extinguish at a given temperature, however, it has never before been experimentally confirmed and announced.

The present inventor therefore has conducted the following experiments and confirmed the fact that the permanent electric poles of tourmaline are extinguished at 950° to 1000° C. The experiments will now be described below roughly.

Experiment 1

Igneous rock (produced in Kamaishi) containing about 8 to 10% of iron tourmaline was crushed into stones of about 5 to 10 cm, from which the crushed stones having a large content of tourmaline were selected visually and were used for the experiment.

Copper sulfate was dissolved in an amount of 2 g in 1000 cc of purified water (deionized water) to obtain a bluish solution due to copper ions. 500 grams of the crushed stones containing the tourmaline were immersed in this solution and were left for 24 hours. The blue color due to copper ions disappeared and the solution became colorless and transparent. After another three days, the black tourmaline portions on the surfaces of the crushed stones changed into a green color. This is the color due to a basic carbonate of copper [$5H_2O.CuCO_3.Cu(OH)_2$] which is so-called patina. This points to the fact that copper ions in the copper sulfate solution are electrically deposited on the portions corresponding to the negative poles of the tourmaline. However, no copper ion is electrically deposited on some exposed portions of the same tourmaline. These portions are ones

corresponding to positive poles that have the same electric charges as the copper ions which are cations.

Experiment 2

The crushed stones were maintained at temperatures of 900° C., 950° C., 1000° C. and 1050° C. for one hour, and were then gradually cooled. The same results of the experiment using the four kinds of samples as those of the aforementioned Experiment 1 were exhibited. No change occurred in the color of the copper sulfate solution in which were immersed the samples maintained at 1000° C. and 1050° C. It is considered that the temperature corresponding to a Curie point lies between 950° C. and 1000° C. Presence of the temperature corresponding to the Curie point was found by conducting further experiments by other methods and by conducting the electrodeposition of several kinds of metals (copper, silver, nickel, etc.) and by chemically analyzing the amount of electrodeposition. The results all point to the possession of permanent electric poles by the tourmaline crystals and the presence of the temperature that corresponds to the Curie point somewhere between 950° C. and 1000° C.

The tourmaline resembles a ferroelectric substance in the sense that it exhibits pyroelectricity but is different from the ferroelectric substance in the sense that it does not exhibit a domain structure. It has further been described in the literature that those having permanent electric poles have not yet been found in ferroelectric substances. The tourmaline crystal bonds consist chiefly of ionic bonds but partly contain covalent bonds mixed therein.

Tourmaline is widely produced in ten or so countries including Brazil, Soviet Union, U.S.A., etc., and is used as a raw ore for jewels.

Most of the tourmaline was formed more than 10,000 years ago, in the age of neo-man (Cromagnon man) in terms of the history of man.

Despite the peculiar existence of tourmaline having permanent electric poles, tourmaline has been not so far much studied except for its use as a jewel.

The permanent electric poles possessed by tourmaline can be used in various applications. In order to study the actions of the permanent electric poles of tourmaline in water, the present inventor has prepared a granular material containing tourmaline as described below.

(1) The tourmaline country rock containing tourmaline in amounts greater than a certain value is sorted and is pulverized into a fine powder (several microns).

(2) A fine ceramic powder having high insulating property and good quality and the above powder of (1) were mixed together, and were granulated and sintered to prepare ceramic particles 3.0 to 3.2 millimeters in diameter.

(3) The granular material was subjected to the "mutual rubbing" method in which the particles were rubbed by each other in water, so that the surfaces of the granular material may became as smooth as possible and one surface of the tourmaline crystal may be exposed.

The thus obtained granular material was charged into a pipe made of stainless steel.

The height of the layer of the charged granular material was about 10 to 20 cm. On the upper and lower sides of the charged layer, stainless screens were disposed so that the granular material could not leak. The volume of the spaces defined by the stainless screens was about 1.2 times as great as the volume of the granular material. This is called the fluidization layer.

An instrument 1 of a single structure was prepared as shown in FIG. 1, orifices 1*a*, 1*b* are provided on the upper and lower sides to permit the flow of water only, and an ascending stream through the fluidization layer is-allowed. A phenomenon was expected that was created by the electric pole reaction with the water passing through the instrument 1 and the tourmaline electric poles on the surfaces of the tourmaline free bodies 2. Fine tourmaline crystals 2*a* are buried in a ceramic material 2*b* having a high electrically insulating property, so that the fine tourmaline crystals on the surfaces of the tourmaline free bodies 2 would not come close to each other to cancel the electrodes of opposite polarities. FIG. 6 shows this state. It is desired that there exist the tourmaline electrodes as many as possible on the surface. The content of the tourmaline that is considered to be suitable is from about 5 to 10% of the total amount of the granular material.

Based upon the inventor's experiments, the optimum size of the tourmaline crystals should preferably be about 3 microns on the average. The optimum diameter of the free bodies, preferably in the shape of spherical pellets, should be in the range of about 3–5 millimeters, the difference between the diameters of the pellets preferably being only about 0.5 millimeter or less. As noted above, the optimum content of tourmaline crystals in the free bodies is 5 to 10%. This is calculated by the inventor to provide the poles of between 100,000 and 1,000,000 tourmaline crystals exposed on the surface of a free body.

A preferred composition of the free body containing fine tourmaline crystals and an electrically insulating material is as follows:

1) 10%—of a fine powder of tourmaline, the crystals being 3 microns on the average;

2) 40%—of Al_2O_3 powder more minute than 3 microns;

3) 40%—of boric silicic acid group glass powder more minute than 2 microns; and

4) 10%—of a clay group molding assistant powder more minute than 3 microns.

These components may be mixed, granulated and baked at up to 950° C. for 2–3 hours to form the tourmaline free bodies. The tourmaline free bodies may then be stirred in water so that the poles of the tourmaline crystals on the surface of the free bodies are completely exposed on the surface.

Preferred compositions of free bodies, as mentioned above, contain fine tourmaline crystals together with ceramic materials having dissimilar dielectric constants. More preferably, a free body may contain fine tourmaline crystals and more than one type of ceramic material having dissimilar dielectric constants, for example alumina and silica. The dielectric constant of Al_2O_3 is 9.5, while the dielectric constant of SiO_2 is 3.5. Alternatively, the housing may contain free bodies containing fine tourmaline crystals and one ceramic material and other free bodies containing another ceramic material, the ceramic materials having dissimilar dielectric constants.

There are a variety of different apparatuses conceived of and constructed by the inventor using the tourmaline crystals according to the present invention. The embodiment shown in FIG. 1 is primarily directed to an "in-line" arrangement, i.e. the housing is disposed within a water conduit or supply line. These embodiments are primarily intended to remove incrusted contaminants from a water conduit. They are preferably placed in a vertical arrangement within the conduit or supply line with the water flow going upwardly in order to obtain the best results. Alternatively, the housing may be designed for "end-of-line" use, i.e. as a water activator or purifier, e.g. the housing is connected at the shower head or water faucet. These latter embodiments are

designed to take advantage of the surface activating activity of tourmaline crystals on water itself by softening the water (i.e. chelating ions), improving the taste of the water by reducing or removing the taste of Cl, etc. Finally, another significant embodiment is a device or case containing the tourmaline crystals which can be used, for example, in a washing machine or dishwasher. In the washing machine embodiment, the case should preferably be constructed of a shockproof and resilient material. The inventor has discovered that the tourmaline crystals are very effective in removing iron and metal ions from the water, and in significantly reducing the need for detergents and chelating (water softening) agents.

The amount of tourmaline-containing free bodies in a housing or case required varies depending upon the volume of water flowing therethrough. This amount can be readily determined by one of ordinary skill in the art. A washing machine case may contain 20 grams of tourmaline pellets, on the other hand an in-line apparatus for commercial use requires much more.

In the case of the iron tourmaline as described above, it was confirmed that the temperature (Curie point) at which the tourmaline loses the permanent electric poles, i.e., at which the electric polarization extinguishes, lies somewhere between 950° and 1000° C.

Next, described below is the reaction between the water passing through the fluidized layer and the tiny electric poles of the tourmaline. Though the water molecules are represented as H_2O, the condition of water in practice is very complex and is dynamic. Interatomic bonding of hydrogen and oxygen constituting the water molecules and the coupling and collection of water molecules are all dynamic and never stay under a static condition even for a moment. Under normal conditions, two hydrogen atoms and one oxygen atom of a water molecule are bonded together with the same bonding force. There, however, may exist a moment at which the oxygen atom is strongly bonded to one hydrogen atom but is loosely bonded to the other hydrogen atom. In such a case, H_2O is divided into an H^+ ion and an OH^- ion.

This state is shown in FIG. 3, wherein hydrogen and oxygen constituting a water molecule and sometimes OH^- ions are dynamically bonded together.

As a result, water behaves like a single huge molecule. This state cannot be expressed using a static model or formula but its overall condition at a moment can be considered. If the condition of water is statistically analyzed, it can be said that the water is under an equilibrium condition expressed by

$$H_2O \leftrightharpoons H^+ + OH^-$$

even when no electric field is applied thereto. When the equilibrium formula is expressed using words, water is said to be "very weakly dissociated".

When there exist electric poles of tourmaline in water, H^+ ions and OH^- ions migrate toward the surfaces of electric poles of polarity opposite to those of the ions, and an electric current flows between the electrodes. The current varies in proportion to the voltage across the electric poles. When this voltage is lower than a so-called electrolytic voltage of water as represented by a portion on the left side of point D in FIG. 3, a hydrogen gas may evolve on the cathode surface but no oxygen gas evolves on the anode surface.

A hydrogen ion H^+ is bonded to a water molecule to form H_3O^+ (hydronium ion) (FIG. 3). The three protons are bonded to oxygen atoms by the same bonding force at this moment, and their motions are very dynamic.

In this case, the hydrogen ion i.e., the hydronium ion migrates not as the migration of ionic substance; namely, due to the migration of electric charge, H^+ ions only transfer from a hydronium ion to the neighboring water molecule and, as a result, it seems the hydronium ion migrates. At this moment, the electric charge that participates in the electric conduction exhibits the co-called "protonic conduction by hopping model" (see FIG. 4).

As for the migration of OH^- ions (hydroxyl ions), the OH^- ion of $H_3O_2^-$ having electric charge migrates in a manner of passing a baton by the hopping model in the same manner as the case of H^+. The migration speed of H^+ ions is about 1.8 times faster than the migration speed of OH^- ions. The electrolyte ions other than H^+ and OH^- ions migrate at speeds of about ⅕ to 1/10 times as fast as the H^+ ions.

As described above, the migration speed of OH^- ions is about one-half the migration speed of the H^+ ions. Furthermore, the H^+ ions are relatively easily discharged and precipitated on the electrode surface and turn into H_2 and are lost in the form of gas from the water. At a voltage lower than the electrolytic voltage of water, on the other hand, the OH^- ions have a large discharge potential on the electrode surface and are absorbed in their own form or are diffused in water. For these two reasons, the OH^- ions are liberated from the H^+ ions, and assume a free condition in water. The condition of the OH^- ions is unstable even from the viewpoint of energy and is an active one. These ions are bonded to water molecules to form $H_3O_2^-$ (hydroxyl ions). The free hydroxyl ions exhibit properties as an interface activating substance.

The interface activity is a phenomenon in which the interface energy decreases when a substance dissolves in a liquid. In order that the interface activity is exhibited, the substance must be such that hydrophobic and hydrophilic groups coexist in a molecule thereof. These groups must keep their balance in a given range. The interface activity can be recognized by practical tests for concrete actions such as solubilization and emulsification.

It will be considered below that the interface activity exhibited by the liberated hydroxyl ions ($H_3O_2^-$) produced in water that has passed through the fluidized layer of the tourmaline granular material. The hydroxyl ion has a simple structure, that of a water molecule H_2O is bonded to OH^-.

H—O—H corresponds to a hydrophilic group and the rest H—O, particularly H— serves as a hydrophobic group.

A model that a hydroxyl ion forms a small anionic interface activating substance shown in FIG. 5 can be considered. The negative charge of OH^- transfers to O of H—O—H (to a place where a negative charge is marked in the drawing). As a result, the H—O and two H⁻s of water are strongly bonded together.

Described below is the interface activity and, particularly, the emulsification action of water.

Heavy oil A of an amount of about 5% of the amount of water is mixed and stirred well. After some period of time, the heavy oil is mostly separated and floats on the surface of water but is partly emulsified and forms a stable dispersed phase. In water that has not passed through the fluidized layer, on the other hand, such a stable emulsion is not formed and the heavy oil easily separates from the water. When a droplet of water is added to this stable emulsion solution, the added water disperses in the whole emulsion solution to form a uniform layer. This fact indicates that the emulsification action is an oil-in-water emulsion (O/W type) and is not a water-in-oil emulsion (W/O type).

The H.L.B. value (hydrophile-lipophile balance) of an interface activating agent suitable for preparing the O/W-type emulsion (oil emulsion in water) is determined experi-

mentally by comparison with various emulsifying agents, and is used for selecting an emulsifying agent suitable for the applications and for knowing the work of the emulsifying agent.

Relationships between the H.L.B. values and the applications are shown in FIG. 7, and relationships between the H.L.B. values and the solubility are shown in a Table on the last page of the present disclosure. From this Table, the water that is emulsified assumes a stable milky condition and it is estimated that the H.L.B. value is from 8 to 10.

There have been proposed some methods for calculating the H.L.B. values. Among them, the Kawakami's method and Atlas' method are used to calculate the H.L.B. value of water containing hydroxyl ions.

(1) Kawakami's method.

H.L.B. value=7+4.02 log Mw/Mo, where Mw and Mo are the molecular weights of a hydrophilic group and a hydrophobic group and Mw=18, and Mo=17, respectively. Therefore, the H.L.B. value =7.5.

(2) Atlas' method The Kawakami's method and Atlas' method have conversion graphs, from which the H.L.B. value is found to be 10. According to these two kinds of calculations, it is estimated that the H.L.B. value lies from 7.5 to 10, which is in good agreement with 8 to 10 estimated from emulsification experiments.

Further, the substance that exhibits the emulsification action of the O/W type means that it has a property to emulsify oil components of the ordinary "foul components" made up of a mixture of oily foul matter and solid particles and to disperse the emulsified components in water, to invalidate the adherence of the remaining solid particles to the base members. This indicates the existence of a so-called cleansing action and proves the fact that water that has passed through the fluidized layer of tourmaline granular material and really removes oily foul matters and like matters. The interface activity of water quickly decreases and extinguishes in about three days. This can be easily observed by a experiment of emulsification. The time limit of three days becomes no hindrance in practice.

The fact that the water that has passed through the fluidized layer of tourmaline granular material exhibits interface activity without any chemical agent offers very great practical applicability.

The following actions are further exhibited in addition to the interface activity.

(1) The PH value is shifted toward the neutral point irrespective of whether it is acidic or alkaline.

(2) Hydrolysis of chlorine dissolved in water is promoted and Cl_2 is changed into HOCl, OCL^-, etc. to greatly lessen stimulation, taste and odor of chlorine.

(3) Weak reducing action is exhibited.

(4) A polymer such as active silica that exhibits coagulating effect is formed. This is attributed to the ionization of alumina, silica, iron oxide, etc. that constitute tourmaline granular material and to the polymer crosslinking action based on the electric poles reaction.

These actions multiply upon one another to exhibit a great effect.

Described below are the principal applications in which the interface purifying apparatus using tourmaline granular material and the method thereof are put into practice.

(1) Removal and prevention of red water, scale and slime of water-supplying and -distributing conduits in buildings.

(2) Utilization of various effects in kitchen, bath room, washing and other works using water by connecting the apparatus to the water supply pipe in dwellings.

(3) Installation for water source of public bathhouses or of any other baths.

(4) Arrangement in a circulation conduit such as of swimming pools.

(5) Utilization as water for cooking, processing and washing foods.

There are a variety and wide range of fields in which the invention can be applied, which reflects the importance of water in our lives.

According to further embodiments, the fine powder of tourmaline may be electrically insulated with a ceramic material to further reinforce the abrasion resistance. Moreover, the free bodies may be mixed with free bodies of electrically insulating ceramic particles having a dissimilar dielectric constant.

The interfacial purifying apparatus using tourmaline, method thereof and tourmaline granular material according to the present invention are constituted as described above, making it possible to obtain water having surface activity using neither a chemical agent nor electric energy supplied externally.

I claim:

1. A water treatment method using tourmaline, which comprises:

passing water through a housing containing a plurality of free bodies, the free bodies comprising a mixture of fine tourmaline crystals which possess polarity and an electrically insulating material which electrically insulates the fine tourmaline crystals from one another, wherein the free bodies contain tourmaline crystals which are about 3 microns in size, wherein the free bodies have a spherical shape and a diameter in a range of 3 to 5 millimeters, wherein the free bodies contain 5 to 10% fine tourmaline crystals, 40% of Al_2O_3 powder more minute than 3 microns, 40% of boric silicic acid group glass powder more minute than 2 microns, and 10% of a clay group molding assistant powder more minute than 3 microns and wherein the housing includes means for passing water through the housing while preventing the passage of free bodies out of the housing, so that the free bodies are brought into contact and collision with one another and so that matters adhered to the surfaces of the free bodies are dislodged therefrom.

2. The water treatment method using tourmaline according to claim 1, wherein the housing is disposed and operatively connected in an in-line arrangement within a water conduit or supply line.

3. The water treatment method using tourmaline according to claim 2, wherein the housing is disposed vertically within the water conduit or supply line and the water flow within the water conduit or supply line is upwardly.

4. The water treatment method using tourmaline according to claim 1, wherein the housing is disposed and operatively connected in an end-of-line arrangement at the terminal end of a water supply line.

5. The water treatment method using tourmaline according to claim 1, wherein the housing is a separate casing disposed within a water-containing enclosure.

6. The water treatment method using tourmaline according to claim 1, wherein the electrically insulating material contains a ceramic material.

7. The water treatment method using tourmaline according to claim 1, wherein the electrically insulating material contains two or more ceramic materials having dissimilar dielectric constants.

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